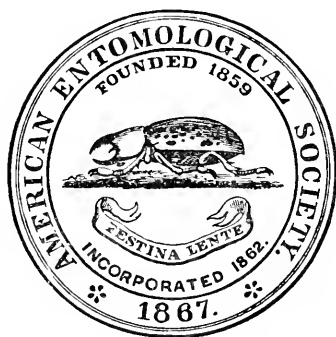




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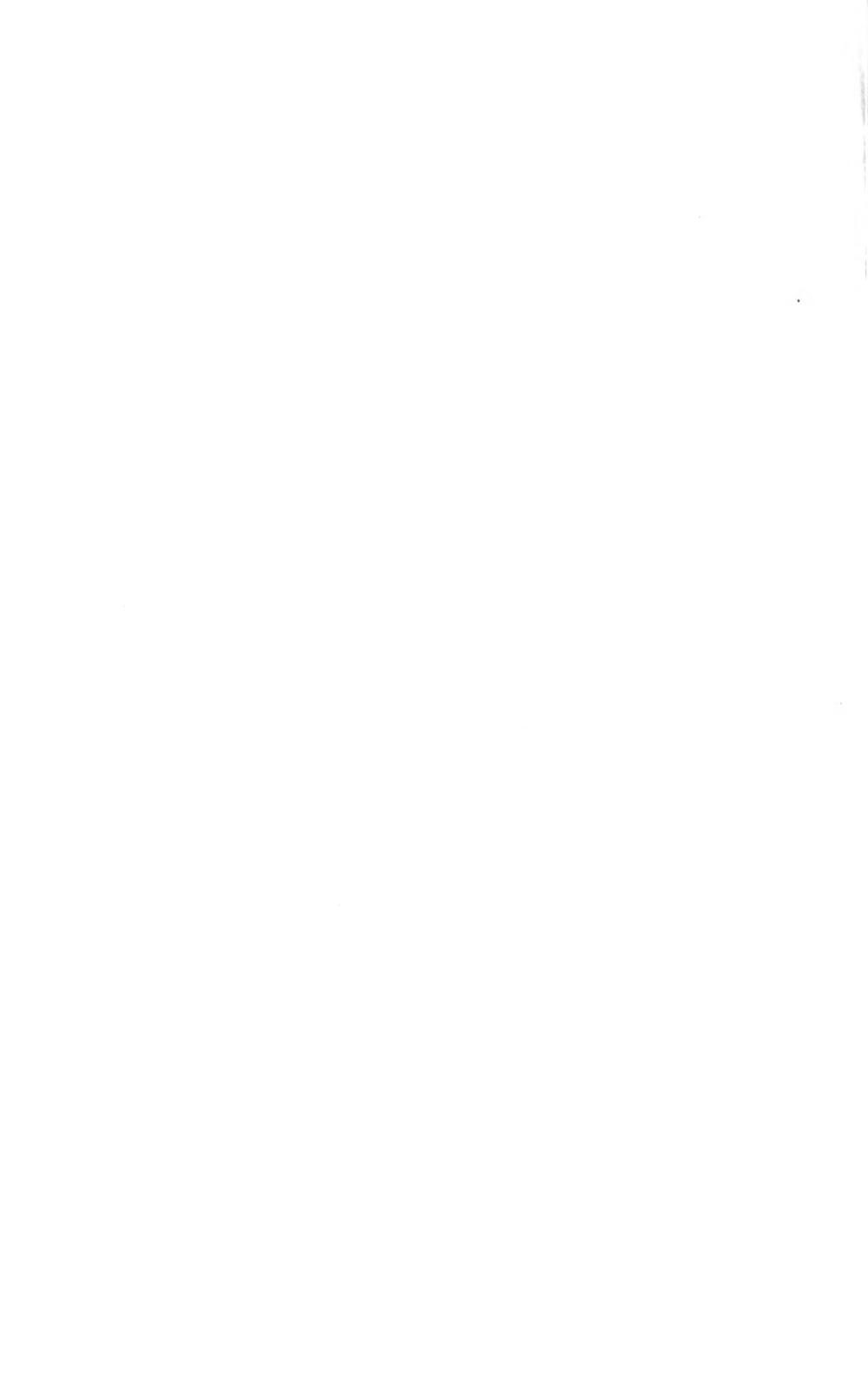


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TRANSACTIONS
OF THE
AMERICAN ENTOMOLOGICAL SOCIETY

VOLUME XLI

NEW SPECIES OF HETEROCERA FROM TROPICAL
AMERICA

BY W. SCHAUS

All my types up to date are in the United States National Museum, Washington, D. C.

ARCTIIDAE

Afrida sceleteozona sp. n.

♂. Fore wings white; base of costa and a subbasal half line black, the latter angled; a dentate line of dark scales across middle of wing, followed by a curved mark in the cell, and a similar outer line outangled below subcostal and followed by a small dot on discocellular; a dot on upper third of termen; some dark scales at apex, and on fringe. Hind wings whitish shaded with pale gray on veins and margin; a round discal dot; a curved postmedial line. Expanse, 13 mm.

Habitat: Juan Viñas, Costa Rica.

Afrida polyglotta sp. n.

♀. Fore wings silvery white; costa with three black dashes, the outer two convergent, with a yellow shade between, and an arc before apex; a large purple gray patch on outer margin, covering tornus and projecting roundedly inward, edged above by an irregular black line, broken centrally by a vertical dash; above the end of the purple patch a black dot sends a line outward and downward, dentate and broken below, leaving a dot on inner margin; a dentate double line on basal third of inner margin forming a closed loop above; a black dash beyond it below the second costal dash. Hind wings gray, the apex and discal dot a little darker. Expanse, 15 mm.

Habitat: Juan Viñas, Costa Rica.

Robinsonia longimacula sp. n.

♂. Palpi brown spotted with white. Head white with two transverse black lines. Thorax white with a dorsal yellow streak; patagiae and tegula white edged with brown. Abdomen above black; a dorsal yellow line; a lateral white line; abdomen below whitish. Fore wings olive brown, the veins paler; a series of elongated white spots from apex to submedian fold, the spot below cell extending from base to termen, the others from cell not reaching termen; the spots above veins 6 and 7 shorter. Hind wings white; some fuscous shading from anal angle upwards, and terminally at vein 2. Expanse, 42 mm.

Habitat: Joinville, southeastern Brazil.

Prumala ochrida sp. n.

♂. Head, collar, and thorax orange brown. Abdomen above roseate, underneath yellowish. Fore wings yellowish, the markings brown; the veins from cell orange brown; basal third suffused with brown leaving a yellow streak above subcostal, a spot at base of cell, a streak below cell, and a spot on submedian, also an antemedial spot on fold yellow, all partly edged with red; some brown suffusions at end of cell; some postmedial spots on interspaces; a broad outer band, narrowest from vein 5 to vein 2, suffusing below vein 2 and cell with dark basal space, leaving only a large yellow spot medially on inner margin, and a smaller spot above it; a subterminal row of broken spots; spots at ends of veins; cilia whitish with black spots at veins. Hind wings yellow suffused with roseate. Expanse, 36 mm.

Habitat: Joinville, southeastern Brazil.

Prumala nigranalís sp. n.

♀. Head, collar, thorax and fore wings lilacine brown. Abdomen yellow, the last three segments steel black above, steel gray below; a lateral gray streak. Hind wings yellow. Expanse, 32 mm.

Habitat: Joinville, southeastern Brazil.

Very close to *P. jalapa* Druce.

Pseudalus minerva sp. n.

♂. Antennae and body rose red; abdomen white underneath. Fore wings red; a gray streak on costa; some grayish irrorations antemedially and postmedially with traces of darker red lines; a large semihyaline yellowish space postmedially from above subcostal to termen at vein 2; an apical square red patch from vein 5 to costa; a white point at base. Hind wings yellowish white; some roseate hairs close to inner margin and terminal red irrorations. Expanse, 35 mm.

Habitat: Nova Friburgo, Brazil.

Chlorhoda amabilis sp. n.

♂. Head, collar, thorax above, front of fore legs, and fore wings bright green; patagiae edged with crimson. Abdomen above, thorax below, and legs crimson; abdomen below yellowish roseate. Fore wings: the costal edge yellowish; small black linear spots antemedially, postmedially at subcostal vein and on inner margin. Hind wings roseate, the termen shaded with pale green. Wings below duller and paler; the costal margins shaded with roseate, also the inner margin of hind wings. Expanse, 32 mm.

Habitat: Nova Friburgo, Brazil.

NOCTUIDAE

Vespola similissima sp. n.

♂. Differs from *V. plumipes* Schs. in the absence of the long fringe on hind tibiae; also very similar to *V. caerulifera* Wlk., but larger and darker, and without any traces of white on the abdomen below. Expanse, 36 mm.

Habitat: Nova Friburgo, Brazil.

Pseudocraspedia eubleptica sp. n.

Fore wing tinged with yellow along costa and apex, the rest of the wing blackish gray; a very oblique black line from inner margin near base directed toward the upper sinus of outer margin but stopping before it; an oblique white line from middle of inner margin running up toward apex. Hind wing with a broad white band in the middle, straight within, curved without; base dark gray with a black band outwardly; margin rather broadly gray. Expanse, 12 to 14 mm.

Habitat: Caché, Tuis, Juan Viñas, Costa Rica.

Allied to *P. leucozona* Hampson.

Lycaugesia homogramma sp. n.

Fore wing pointed at apex, outer margin oblique; brownish straw-color irrorated with purple and reddish scales; a row of three dark dots for the antemedial line; reniform large, rounded, purplish gray; outer margin shaded with purplish forming an oblique streak from apex toward reniform. Hind wing crossed by straight, transverse bands; a double middle one, with its outer edge more distinct than its inner, a median reddish shaded one and a brown one close to the margin. Terminal black dots on both wings. Expanse, 15 mm.

Habitat: Juan Viñas, Costa Rica.

Allied to *L. semiclara* Dyar. The wings are without the blackish transverse bands on the under side shown in *L. hypozonata* Hampson, the fore wing having only a longitudinal shading in the cell.

Euteila inconstriatrix sp. n.

Dark chocolate brown, with little or no red shading, sometimes a small patch beyond the brown discal mark. Inner line slender, white, strongly outcurved centrally; postmedial line similar, obsolete on costa, running below median vein near to inner line; reniform narrow, not constricted, straight without, convex within, pale-lined, filled by the ground color, followed by a large dark brown patch which is pointed at its upper angle; two slender white lines from costa subapically joining on termen and enclosing a dark brown cuneiform mark; traces only of subterminal line below; an oblique brown patch above the angle in the termen; a terminal row of dark dots, obsolete below. Hind wing blacker, the base on inner margin white to below discal spot. Expanse, 27 to 29 mm.

Habitat: Juan Viñas, Tuis, Costa Rica.

Allied to *E. auratrix* Walker, but darker and the reniform not constricted.

Pucialia acronyctoides sp. n.

♂. Palpi other white, laterally streaked with black at base. Body whitish gray streaked with black, the vertex and collar medially shaded with black. Fore wings whitish gray, somewhat silvery beyond basal space; base irrorated with black; antemedial line fine, black, wavy, slightly outcurved, followed by a straight heavier black line, oblique and not reaching inner margin, this line is followed by a short black streak above subcostal vein, a small spot in cell, and one below cell, also a slate gray shade above median to just beyond cell; an irregular black mark across discocellular intoothed in front; postmedial line black, outcurved around cell, very wavy from vein 3 to inner margin, followed by a grayish brown shade from vein 3 to vein 7, where it extends more obliquely to costa; a subterminal irregular white line followed by black mottling on costa; marginal black points on interspaces; cilia with darker shading opposite marginal points. Hind wings semihyaline white, the costa faintly tinged with luteous. Fore wings below dark gray, the inner margin broadly whitish. Expanse, 43 mm.

Habitat: Nova Friburgo, Brazil.

Hemicephalis grandirena sp. n.

♀. Head, collar, thorax and forewings brownish lilacine. Abdomen above dull brownish gray. Fore wings: the base darker shaded; a fine whitish vertical subbasal line; antemedial line fine, dark olive green, slightly incurved across median, followed in cell by a large white orbicular spot, suffusing with a white shade on costa; reniform very large, dark olive green consisting of two round superimposed spots finely edged with white, the spots suffusing on inner edge, and also in front with a green shade on costa; postmedial outcurved, very fine, geminate; an olive green triangular spot on costa before apex, finely edged with white; traces of a whitish dentate subterminal line; a dark olive brown terminal line. Hind wings white, the veins brown; termen

very broadly black; cilia white. Wings below whitish, the terminal third tinged with lilacine brown; on fore wings a large black postmedial shade, not reaching costa, or inner margin; apex white. Expanse, 37 mm.

Habitat: St. Jean, Maroni River, French Guiana.

Pharga barbara sp. n.

♂. Palpi fuscous brown fringed above with ocher. Head, collar, thorax, basal and anal hairs of abdomen, and fore wings yellowish ocher. Abdomen and hind wings dull fuscous brown. Fore wings irrorated with brown; the inner margin shaded with brown from base to beyond middle; a black discal point; a postmedial outcurved brownish shade, somewhat macular, followed by similar lunular-dentate lines except between veins 4 and 6; the veins defined by darker irrorations on either side. Marginal black points on interspaces. Hind wings: cilia yellowish ocher. Fore wings below shaded with fuscous except on margins. Hind wings below yellowish ocher irrorated with brown on costal and outer margins; a dark round discal spot and faint postmedial shade. Expanse, 45 mm.

Habitat: Nova Friburgo, Brazil.

NOTODONTIDAE

ARPEMA gen. nov.

♂. Palpi upturned, short, not reaching vertex; second joint heavily fringed; third joint very small, roughly scaled. Head without prominent tufts. Antennae bipectinated for two-thirds of their length. Abdomen long. Fore wings: outer margin oblique; vein 2 well beyond middle of cell; vein 3 before lower angle; 4 from lower angle; 5 just above middle of discocellular; areole long and narrow; vein 6 before middle of areole; 7, 8 and 9, 10 from end of areole; 11 free. Hind wings triangular; costal margin convex at base; veins 3 and 4 from lower angle; 5 above middle of discocellular; 6 and 7 from upper angle; 8 connected with 7 before middle of cell by a bar.

Type of genus, *Arpema megalopia* Schaus.

Arpema megalopia sp. n.

♂. Palpi fuscous brown. Head yellow brown. Collar fuscous brown. Thorax light brown, the patagiae lilacine irrorated with dark brown. Abdomen orange brown. Fore wings: base narrowly mottled steel gray and white, limited by an inbent, irregular whiter line, the costal edge orange brown; antemedial space brown, the scales broad, each scale tipped with fuscous brown, vaguely limited by a fine, irregular outcurved line; space beyond gray irrorated with brown, limited by a fine dark line, angled on costa, and faintly incurved, so the gray space is widest on costa and inner margin; this line is followed by a white line which is outbent on costa, is outwardly shaded with orange brown and then followed by a broad dark brown shade extending to costa and tornus, the scales forming it smaller than on antemedial space; and

also tipped with fuscous brown; terminal space broadly lilacine, the subterminal indicated by darker lilacine shading; brown marginal lunules, and narrower terminal lunules partly on cilia. Hind wings orange brown, paler shaded postmedially, and crossed by a dark brown line. Wings below creamy white, the costal and apical spaces of fore wings shaded with brown, only narrowly so on hind wings. Expanse, 58 mm.

Habitat: Joinville, southeastern Brazil.

Misogada blerura sp. n.

♂. Head, collar and thorax mottled dark olive green and white. Abdomen purplish brown above, whitish laterally and underneath. Fore wings whitish irrorated with olive green; a black basal point below median; a broad antemedial dark olive green fascia from costa to submedian edged by black lines, both inbent on submedian, the inner edge deeply curved, the outer oblique, closely followed by a fine olive green line, which suffuses on inner margin with a similar outcurved postmedial line; two black points on discocellular; the postmedial followed by a black line from inner margin to vein 2, by black points on veins 3-5, by a black shade between 6 and 8, and an olive green shade on costa; cilia shaded with olive green and with some dark spots.

Hind wings whitish, shaded with fuscous gray terminally. Cilia olive green tipped with white. Expanse, 30 mm.

Habitat: Nova Friburgo, Brazil.

Malocampa friburga sp. n.

♂. Head, collar, and thorax streaked whitish and dark brown. Abdomen brownish gray, the anal segment whitish gray with dark brown irrorations; base of abdomen dorsally tinged with orange. Fore wings pale brown, the inner margin broadly whitish, the whole irrorated with fuscous; a fine dark antemedial line, vertical, lunular, inangled close below subcostal; two small black spots on discocellular; a fine brown postmedial line incurved to inner margin near antemedial, followed by geminate black points on veins with white streaks between them; a faint subterminal narrow darker shade; terminal black spots on interspaces; black spots on cilia at veins. Hind wings whitish suffused with pale brown, the costal margin and veins darkest; a faint postmedial line with a black spot close to inner margin, and a similar spot below it at anal angle. Fore wings below suffused with dull brown; cilia with dark spots. Hind wings below dull white. Expanse, 49 mm.

Habitat: Nova Friburgo, Brazil.

LASIOCAMPIDAE

Titya albiapicata sp. n.

♂. Head, collar, and thorax light brown. Abdomen darker brown. Fore wings brownish gray suffused with fuscous, the inner margin narrowly, and termen more broadly light brown; the veins pale; lines very indistinct; an outcurved fuscous antemedial line; two medial lines, the outer one suffusing

on inner margin with first postmedial line; three postmedial lines, somewhat lunular, the middle one barely traceable; a whitish subterminal line; the apex fuscous crossed by a small white spot. Hind wings semihyaline, fuscous brown; the inner margin and cilia light brown. Expanse, 28 mm.

Habitat: Nova Friburgo, Brazil.

Ciaphe semifunebris sp. n.

♂. Body mottled whitish, brown, and black. Fore wings: base to near middle black, limited by a fine velvety black line having a few whitish scales on its inner side, finely wavy, vertical, inangled below submedian fold; outer space white with brownish irrorations, more thickly terminally; a small black spot on discocellular; a fine black postmedial line, outbent on costa, then slightly incurved and vertical below vein 4; an irregular subterminal macular black shade, outcurved from costa, incurved opposite cell and near inner margin. Hind wings: basal space fuscous brown limited by a vertical broad black line from costa to inner margin near angle; terminal space as on forewings, but shaded with brown from below vein 5 to inner margin; very faint traces of a black subterminal line. Wings below whitish tinged with brown and gray. Fore wings: postmedial line whitish defined by shadings, straighter below costal curve; subterminal better defined. Hind wings: a fuscous brown vertical outer line. Expanse, 35 mm.

Habitat: Nova Friburgo, Brazil.

Ocha gorgas sp. n.

♂. Body pale lilacine brown. Fore wings above median and vein 4 grayish, below them light brown; two fuscous points on discocellular; traces of fine darker, antemedial, and medial lines; the postmedial outcurved, better defined, followed by a pale outer line incurved opposite cell, the interspaces between them from vein 4 to vein 8 darker gray; a subterminal lunular white line, preceded by an orange brown shade between veins 4 and 5, and dark gray shades between 5 and 6, and 7 and 9; a terminal whitish line; the cilia dark brown on interspaces. Hind wings yellowish, with darker shading on costa and short lines at apex. Wings below brownish yellow. Expanse, 25 mm.

Habitat: Joinville, southeastern Brazil.

LYMANTRIIDAE

Trochuda ochreata sp. n.

♂. Body and wings pale ochreous brown, the inner margin of fore wings, and costal margin of hind wings tinged with white. Fore wings: a fine whitish line on discocellular preceded and followed by a fuscous brown shade, and similar shading close to cell between veins 3 and 5. On abdomen dorsally at end some purple red shading. Wings below whitish, the costal half of fore wings shaded with brown, very dark along costal edge. Expanse, 33 mm.

Habitat: Southern Brazil.

Trochuda partalba sp. n.

♂. Body white, the palpi outwardly brown; some faint brownish shading dorsally on abdomen. Fore wings pale ochreous brown; base and inner margin tinged with white; a white spot edged with darker brown on discocellular, outbent behind between veins 4 and 5. Hind wings white, very faintly tinged with brown towards apex. Wings below white, the costal half of fore wings tinged with ochraceous brown extending along termen to near torus; cilia on both wings tinged with brown. Expanse, 32 mm.

Habitat: Nova Friburgo, Brazil.

Trochuda roseidorsum sp. n.

♂. Palpi dark brown. Head white. Collar, thorax, and wings whitish ocher. Abdomen white at base, then dorsally brilliant roseate. Fore wings: a white line on discocellular, preceded by a narrow black shade, and followed by diffuse black shadings on interspaces from below vein 3 to vein 7. Hind wings slightly paler than fore wings. Wings below white; costa of fore wings shaded with fuscous brown, the apex with whitish ocher. Expanse, 33 mm.

Habitat: Joinville, southeastern Brazil.

These three species are congeneric with *stilpnotia* Walker.

SATURNIIDAE

Micrattacus friburgensis sp. n.

♂. Head, collar, and thorax gray. Abdomen light reddish brown. Fore wings gray irrorated with black hairlike scales; costal space above median and vein 4 shaded with light reddish brown; lines straight, ocher white, outwardly dark shaded; the basal line very oblique from costa near base; ante-medial line very slightly outbent; postmedial line slightly inbent; a fuscous gray streak on discocellular edged with ocher white; a zigzag subterminal pale line from vein 4 to torus; the costal edge grayish. Hind wings light reddish brown; a fine fuscous shade on discocellular; a fine outer black line followed by an irregular fuscous shade; cilia tipped with white. Fore wings below yellow, the costa shaded with reddish brown; a dark streak on discocellular, and a fine postmedial line. Hind wings below shaded with reddish brown; a fuscous line on discocellular; a fine outer line from costa near apex to inner margin at two-thirds from base. Expanse, 39 mm.

Habitat: Nova Friburgo, Brazil.

Hylesia multiplex sp. n.

Rosy brown, head, thorax, and abdomen alike with dense rosy brown hairs; antennae brown, not yellow. Fore wings scarcely falcate, rosy brown with darker lines; basal space nearly solidly filled; outer line broad, incurved below, touching the discal spot at base of vein 3; submarginal line scalloped, lightly shaded; terminal half-band darker. Hind wing with narrow clouded discal mark, the two narrow curved outer lines alike in tone, dark. Expanse, 18 mm.

Type.—♂, Sixola River, Costa Rica. September. No. 11,989, U. S. National Museum.

***Dirphia aphrodite* sp. n.**

♂. Head, collar, and front of thorax fuscous brown; thorax behind dark reddish brown. Abdomen above black with fine orange brown segmental lines; base clothed with dark reddish hairs; sublateral whitish streaks. Fore wings rosy lilacine brown before antemedial and beyond postmedial lines; basal space limited by the antemedial line, outbent across cell and slightly curved to inner margin; medial space dark chestnut brown, paler from vein 2 to inner margin; a sinuous, white spot containing some brown sealing on discocellular, its hind edge straight, toothed to base of vein 3, and outwardly across postmedial line; postmedial line straight, fine, lilacine, parallel with termen; a subterminal fuscous gray shade expanding towards costa. Hind wings grayish brown; the inner margin with roseate hairs; a postmedial darker brown curved shade; an irregular and indistinct subterminal shade. Wings below whitish brown; the brown postmedial line straight on both wings; the cell and costal margin of fore wings and termen of hind wings shaded with brown. Expanse, 48 mm.

Habitat: Curitiba, southeastern Brazil.

MEGALOPYGIDAE

***Repnoa arpi* sp. n.**

♂. Body black; abdomen with segmental whitish lines. Fore wings black to end of cell, terminating obliquely from costa to vein 5, with a small black spot between 5 and 4, a slightly larger spot between 4 and 3, an incurve between 3 and 2, a slight projection below 2, and above submedian, then inset and abrupt on inner margin; terminal space pale brownish ocher, with slightly darker subterminal patches on interspaces; an outer small black spot between veins 6 and 7. Hind wings: basal third black, otherwise whitish ocher brown. Wings below with the terminal space white. Expanse, 28 mm.

Habitat: Nova Friburgo, Brazil.

**STUDIES IN AMERICAN TETTIGONIIDAE
(ORTHOPTERA)****IV**

BY JAMES A. G. REHN AND MORGAN HEBARD

**A SYNOPSIS OF THE SPECIES OF THE GENUS
ORCHELIMUM**

For a number of years the species of the present genus have been greatly in need of study, the literature covering the same showing a considerable number of specific names the exact relationship of which was not known at all or only very indefinitely understood. The keys to the species which we possess, *i. e.*, those of Redtenbacher, McNeill, Blatchley, and Karny, were based largely on characters the value of which our own studies show to be nil or but relative. The attempts made by many workers, ourselves among them, to use the previous keys have resulted in a great mass of misidentifications, due to the fact that the tables used, almost without exception, emphasized valueless or but secondary characters and entirely ignored those of greatest value. Another factor, which has contributed its share to the confusion in the past, has been the difficulty of positively locating some of the older names; a matter which has caused error on the part of everyone who has published at all on the genus.

The examination or possession of types and paratypes of the majority of the species has enabled us to straighten out the tangles and present a clear idea of the relationship of the forms, while much study and correspondence has permitted us to place to our own satisfaction practically all of the older names which caused trouble in the past. The present situation in Europe has precluded our securing certain desirable information concerning these older types, but we feel that anything further would be merely confirmatory and that we have carefully weighed and considered every possible source of information in the literature.

The characters used by us to differentiate the species are easily comprehended, and we feel that the student will have little difficulty in securing from the text, with the aid of the figures, an understanding of the species of the genus.

ORCHELIMUM Serville

1839. *Orchelimum* Serville, Hist. Nat. Ins., Orthopt., p. 522.

1891. *Xiphidium* Redtenbacher, Verhandl. k.-k. zool.-botan. Gesellschaft Wien, xli, p. 493. (In part; not restricted *Xiphidium* Serville, 1831.)

1907. *Orchelimum* Karny, Abh. k.-k. zool.-botan. Gesellschaft Wien, iv, heft 3, p. 82.

GENOTYPE. — *Orchelimum cuticulare* Serville = *glaberrimum* (Burmeister) (by designation of Kirby, 1906¹).

Differential Generic Characters.—When compared with the related genus *Conocephalus* (*Xiphidium* of authors) the genus *Orchelimum* is found to differ not in one or several invariable characters, but instead can be distinguished by combinations of characters and a general complex not found in the other genus. In *Orchelimum* the stridulating field of the male tegmina is larger, broader and in general more extensive, with the lateral section more strongly produced and occasionally almost overhanging (in subgenus *Stenorhoptrum* less indicated and in *Metarhoptrum* little different from that found in *Conocephalus*). The male cerci are never strongly and sharply deplanate distad, instead of generally so as in *Conocephalus*; the dorsum of the same is occasionally carinate and almost invariably more or less excavate at or near the base of the median tooth (this never found in *Conocephalus*), while the cerci are also always unidentate instead of untoothed, unidentate or bidentate as in *Conocephalus*. The male subgenital plate has the distal margin almost always more or less V or U-emarginate, while in *Conocephalus* this portion is generally more or less truncate. The ovipositor has the ventral margin always arcuate in the distal half except in *militare*, while in *Conocephalus* the rule is to have the margins straight. In all the species the prosternum is bispinose instead of unarmed as is occasional in *Conocephalus*, while the distal tibial spurs always number three pairs, instead of less as is found in several subgenera of *Conocephalus*.

¹ Synon. Catal. Orthopt., ii, p. 271, (1906).

The features separating *Orchelimum* from *Teratopa*, *Paraxiphidium*, *Odontoxiphidium*, *Xiphilimum* and *Karniella* are very decided and have been previously emphasized, so it seems unnecessary to discuss them at the present time.

Erroneously Referred Species.—Aside from the American species here treated, and to which we restrict *Orchelimum*, the genus has been considered by some authors to include two Old World species. The first of these, *senegalense* Krauss, is certainly distinct generically and we here separate it as a related but well characterized genus². Karny³ has placed the species *Xiphidium bituberculatum* Redtenbacher, from Australia, in the genus *Orchelimum*. This is undoubtedly not an *Orchelimum*, as the untoothed cercus shows. Just what its relationship to *Concephalus* (*Xiphidium* of authors) is, we cannot say, but that the species has no place in *Orchelimum* is certain.

Generic Distribution.—From southern Maine, southern Ontario and southern Manitoba (Ashdown) south to southern Florida (Homestead), the Gulf Coast and southern Texas (Brownsville), and in Mexico as far as Orizaba in the eastern part and the state of Jalisco in the west, in the United States west to northern California (Sisson). The genus is apparently absent from the whole desert region of the southwestern United States and also

² **THYRIDORHOPTRUM** new genus (*Θυρίς* *windlow*, *ρόπτρον* *tambourine*). 1877. *Orchelimum* Krauss (not of Serville), Sitzungs-berichte k. Akad. Wissensch. Wien, Math.-Nat. Cl. lxxvi, p. 60.

GENOTYPE.—*Orchelimum senegalense* Krauss.

Related to *Orchelimum* but differing in the more abbreviate dorsum of the pronotum, which in the male sex has the caudal width subequal to the greatest length, in the very narrow lateral lobes of the pronotum, these in the male sex being distinctly deeper than the greatest length of same, in the extremely large stridulating field of the male tegmina, which has the speculum of great size and in width at least two-thirds that of the whole stridulating field, in the more anple tegmina of the male, the bidentate male cerci, the non-spinose character of the genicular lobes of the cephalic and median femora and in the broad fluting of the lateral faces of the ovipositor abruptly terminating shortly proximal of the apex.

Only species:

Thyridorhoptrum senegalense (Krauss)

1877. *Orchelimum senegalense* Krauss, *Ibid.*, pl. I, figs. 12, 12a. [Bakel, Senegal.]

We have before us specimens representing both sexes of this interesting genus.

³ *Genera Insectorum*, fasc. 135, Conocephalinae, p. 7, (1912).

from the Great Basin region, no specimens having been examined from southern California, Nevada, Utah, southern Idaho, western Wyoming and Colorado, or Arizona and New Mexico west of the Rio Grande.

The center of distribution of the genus is in the Middle Atlantic states, the greatest percentage of the forms occurring in the region comprising the states of Pennsylvania, New Jersey, Delaware, Maryland and Virginia, where in the northern end of the Coastal Plain no less than ten of the species of the genus occur. To the southward the number of forms decreases slightly and in the Mississippi Valley region there is a still further diminution, until but three forms are known to reach the region of the Rocky Mountains and of these but one is known to occur west of that uplift. In coastal and southern Texas the number of species is lower than in the Middle West and from the whole of Mexico we at present know of but two forms.

Variation.—An examination of certain characters which have been used by previous authors for differentiating the species of this genus shows that they are either entirely unreliable or only of occasional application. The first and most important of these is the number of spines on the ventro-external margins of the caudal femora. This character has been given a position of prime importance; as a matter of fact, as in *Conocephalus* (*Xiphidium* of authors), quite a few species show considerable individual variation in the presence or absence of these spines, while practically all the forms show great individual variation in the number of the same when they are present. In consequence we have not utilized the spination of the limbs as a major character in making our key, but under each species will be found a summary of the amount of variation in this feature.

The proportionate length of the tegmina and wings is another feature which is, in the majority of cases, of no diagnostic value. This genus, with many other Orthopterous genera, exhibits considerable individual variation in the length of these appendages, individuals taken at the same place and at the same time showing marked diversity in this respect. In over half the species of the genus we find a mesopterous type (*i. e.* with tegmina and wings little or not at all surpassing the apices of the caudal femora) and a macropterous type (with same very considerably surpassing the femoral apices). The extremes of these conditions often

look very different but a careful examination, particularly of the genitalia, will show them to be identical. We have given data on these features under the specific treatments. The width of the fastigium is occasionally variable within specific limits, as in the case of the very plastic *concinnum*. This, however, is quite exceptional, as the fastigial width is generally a constant character. In the stridulating field of the male tegmina we find some variation in the exact form of the speculum, the bounding veins varying somewhat in their exact curve or in their degree of divergence from the body axis when straight, but these differences are of secondary importance and the relative proportions of the speculum and direction of the stridulating vein remain the same. The peculiarly elongate form of the speculum in *volantum* and *bradleyi* is quite distinctive and in no way approached in the other species of the genus. The exact curve and relative length of the ovipositor show little individual variation except in the very plastic *concinnum*, where we have certain female individuals in certain localities and all the female individuals in other localities developing a much longer and relatively straighter ovipositor than usual. Between the two extremes of ovipositor form in this remarkable species we find numerous intermediates and we have gone into this question of ovipositor form quite fully under the specific treatment.

Synonymic Notes.—Two species have been referred to, or described under, this genus which have caused much difference of opinion. These are *Locusta agilis* DeGeer from Pennsylvania⁴ and *Orchelimum gracile* Harris from Massachusetts.⁵ The identity of the first as a species of the genus *Orchelimum* is universally admitted, but it has been variously considered the same as Harris' *vulgare*, Redtenbacher's *laticauda* and Scudder's *concinnum*. Several times DeGeer's species was correctly identified but it was never associated with the Redtenbacherian species, two of which (*spinulosum* and *nitidum*) are synonyms of it. Harris' *gracile* we are certain was correctly referred by Scudder when he synonymized it under *Conocephalus fasciatus* (DeGeer). The description fits that species, but unfortunately the figure

⁴ Mém. Hist. Ins., iii, p. 457, pl. 40, fig. 3, (1773).

⁵ Treat. Ins. New Eng. Inj. Veget., p. 131, (1841).

given in the Flint edition of Harris⁶ shows an individual with a curved ovipositor (*i. e.* a true *Orchelimum* and probably *O. concinnum*). The figures in this edition were drawn under the direction of Agassiz, so the preface informs us, and the ovipositor character of the figure is belied by the text on the same page, this being a reprint of that of the original edition. It is quite evident that the specimen drawn was not the one described by Harris. The name *gracile* certainly does not properly apply to any form of *Orchelimum*. It has been considered to represent the pale-faced phase of *concinnum* by a few authors, but that it has no right to be so considered is very evident.

There has been so much irregularity in the use of the name *agile* that the records quoted under it are almost valueless in mapping the distribution of the species. In the majority of cases it is quite impossible to say which species the author who recorded "*agile*" had before him, and unless the material on which such records were based is definitely recognizable in the series examined by us, we have felt compelled to ignore the indefinite records in our mapping work.

The other names, the application of which has given difficulty in the past or has given trouble to the present authors, are best discussed here. Burmeister's *glaberrimum* has been frequently recorded, but generally the specimens proved to be long-winged individuals of *vulgare*. We have carefully studied the very brief description, have studied the movements of Zimmermann who collected the specimens, eliminated the other forms occurring in the territory where he collected at that time, and there is no doubt in our minds that we have properly located the form. An effort to locate the original specimen has met with no success other than the proof that it does not exist in the Halle collection. Serville described three species of the genus when he originally founded the same, *i. e.*, *cuticulare*, *glaucum* and *herbaceum*. The first of these undoubtedly equals Burmeister's *glaberrimum*, as a careful analysis of the description and comparison with all the known species shows. The second species, *glaucum*, just as certainly equals *agile* (DeGeer) when examined in the same fashion. The last name, *herbaceum*, has been generally placed as the same as *concinnum* Scudder, chiefly because Serville says it has a black

⁶ *Ibid.*, Flint Edit., p. 163, (1862).

area on its face above the clypeus. Unfortunately Serville says this is transverse, which is never true of *concinnum*, but frequently in drying out, individuals of a number of the species show black areas below the eyes and to a similar feature we feel he must refer. The other characters given for *herbaceum* are few and generally non-diagnostic, except that the ovipositor is twelve lines long and lightly concave dorsad, a condition occurring in but a few species. Of these *fidicinium* alone would at all answer the other points of the description and of the identity of the two we are not at all convinced, but we are placing the older name with a query under the more recent name, waiting for future examination of the original material, if such still exists, to determine the matter.

The description of Walker's *validum* we have examined very carefully, and have also had through the kindness of Mr. A. N. Caudell the notes made by the latter on the type of the species, which Kirby considered to be the same as *nigripes*. The original description is very insufficient and Mr. Caudell comments as follows on the specimen: "Last year I saw also his type of *validum*, but without material for comparison I could not definitely determine what it is. I am very sure it is not the same as our *nigripes*. The type is a unique female and the following note was hurriedly made regarding it while I was in London." We are unable to definitely say what the insect is, but it appears to be nearer *nigripes* than anything else. However, it seems best to await more complete study of the original material and we have provisionally placed the name with a query under *nigripes*.

Of the new species described by Redtenbacher in his paper on the subfamily, *i. e.*, *robustum*, *inermis*, *nitidum*, *spinulosum* and *laticauda*, we are able to easily dispose of three, these being *inermis*, *nitidum* and *spinulosum*. The first of these was admittedly proposed to replace *longipennis* Scudder, which equals *concinnum*. Regarding *nitidum* and *spinulosum* we had formed definite conclusions, when through the kindness of Mr. W. T. Davis we were placed in possession of copies of correspondence which passed between that gentleman, Mr. Caudell and Doctors Karny and Holdhaus relative to this subject. A portion of a series of specimens used by the latter gentlemen for comparison has also been placed in our hands so that we are thus able to

judge what *nitidum* and *spinulosum* are. Doctor Holdhaus states that, "*O. nitidum* and *spinulosum* differ externally only by the characters stated by Redtenbacher and may possibly prove forms of the same species." This is quite true, and the characters given by Redtenbacher are valueless in this genus while the size differences are due to locality as we show beyond. Both of these names equal the much older *agile* (DeGeer). The great difficulty encountered with the Redtenbacherian species concerns the other species, *robustum* and *laticauda*, the first of which, as discussed beyond, in all probability equals *nigripes* with abnormal or unassociated leg or legs. It is based on a unique female which in every feature of the description but the caudal limbs is typical *nigripes*. The other species, *laticauda*, appears to us to be the same as Davis's *pulchellum*, the author of which has gone over the description with us and agrees that it probably represents the same form. It was our intention to have material carefully compared in Vienna, particularly with regard to the important genital characters, but the unfortunate conflict now raging has made this impossible.

The present authors at one time very doubtfully determined as *O. cuticulare* Serville⁷ a single male from Thomasville, Georgia. The specimen is not *cuticulare* as we now know it (= *glaberrimum*), but instead is an aberrant individual of *O. minor*.

Relation of the Genus.—Redtenbacher⁸ considered *Orchelimum* but a subgenus of "*Xiphidium*," as the supposedly diagnostic features given by previous authors, *i. e.* the spined prosternum and the curved ovipositor were found by him to be present in "*Xiphidium*." Karny in his several papers on the group has allowed *Orchelimum* to retain generic rank and divided *Conocephalus* (*Xiphidium* of authors) into a number of subgenera. The latter author's position seems to us the most logical, but the characters separating the two genera are largely ones of degree and in consequence hard to express. It is necessary, as well, to divide *Orchelimum* into three subgenera, this being done below. As we will show in a future treatment of the genus *Conocephalus*, the characters separating the subgenera of that genus are as important as the characters separating *Orchelimum* s. s. from several of the subgenera of *Conocephalus*, but we find other groups which

⁷ Proc. Acad. Nat. Sci. Phila., 1904, p. 796, (1905).

⁸ Verh. k.-k. zool.-botan. Gesell. Wien, xli, p. 494, (1891).

are more related to *Orchelimum* than to *Conocephalus* occupying a more or less intermediate position, yet in themselves clearly cut divisions of equal rank to certain other aggregations of the subfamily Conocephalinae. We have been forced to realize that we have more groups in the *Orchelimum-Conocephalus* complex than have previously been recognized by name and the only solution appears to be to designate those divisions which are found to be distinguished by characters of comparative importance, and assemble them as subgenera under the two generic names *Orchelimum* and *Conocephalus* according to the extent of agreement or degree of development of certain features.

Subgenera and Specific Groups.—The three subgenera of *Orchelimum* which we here recognize can be distinguished as follows:

Stridulating field of male tegmina relatively large and broad, as large in area as dorsum of pronotum, speculum not elongate. Humeral sinus of lateral lobes of pronotum more or less distinctly indicated, rarely (*gladiator*) obsolete. Genicular lobes of caudal femora bispinose. Ovipositor with ventral margin regularly arcuate (except in *militare*).

Orchelimum s. s.

(Type—*O. cuticulare* Serville = *glaberrimum* Burmeister.)

Stridulating field of male tegmina relatively large, about as large in area as dorsum of pronotum, speculum decidedly elongate, narrow. Humeral sinus of lateral lobes of pronotum well indicated, arcuato-emarginate. Genicular lobes of caudal femora bispinose. Ovipositor with ventral margin gently arcuate or straight proximad, arcuate distad.

*Stenorhoptrum*⁹ new subgenus
(Type—*O. volantum* McNeill.)

Stridulating field of male tegmina relatively small, not as large in area as dorsum of pronotum, speculum of normal shape but small (except in *superbum*) and *Conocephalus*-like in form. Humeral sinus of lateral lobes not at all or but weakly indicated. Genicular lobes of caudal femora unispinose. Ovipositor? (female unknown)

*Metarhoptrum*¹⁰ new subgenus
(Type—*Xiphidium unispina* Saussure and Pictet.)

⁹ Στενος narrow, ῥοπτρον tambourine.

¹⁰ Μετα between, ῥοπτρον tambourine. In allusion to the intermediate character of the male speculum.

The species of this genus fall into nine groups, which appear to be natural in character. One of these groups forms the new subgenus *Stenorhoptrum*, two constitute the other new subgenus *Metarhoptrum* and the remainder can be assembled under the restricted subgenus *Orchelimum*. The chief criteria which we have used in delimiting these groups are the number of caudal genicular spines and the general form of the male cercus, but we have also taken into consideration other features, as the form of the ovipositor of the female, form and general character of the stridulating field of the male tegmina, the form of the lateral lobes of the pronotum and the general build.

This group arrangement is as follows:

Orchelimum s. s.

GROUP A. (*agile*)

Cerci with simple, rect-divergent median tooth.	Ovipositor falcate.	Stridulating field of male tegmen normal.	Lateral lobes with deeply and broadly indicated humeral sinus.
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GROUP B. (*glaberrimum, vulgare, gladiator, calcareatum*)

Cerci with simple to produced rect-divergent or sub-falcate (distad) median tooth.	Ovipositor falcate or with nearly straight dorsal outline, occasionally very deep.	Stridulating field normal, but large proportionately.	Lateral lobes broad, with well indicated and broad to but little indicated humeral sinus.
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GROUP C. (*bullatum, laticauda, nigripes*)

Cerci heavy, carinate dorsad, with median tooth directed more or less strongly proximad.	Ovipositor strongly falcate, broader mesad than proximad.	Stridulating field normal but broad.	Lateral lobes with humeral sinus hardly indicated, ventrad of same caudal margin is little arcuate.
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GROUP D. (*minor*)

Cerci much as in group C but more incrassate and less carinate.	Ovipositor falcate, long, broad and heavy.	Stridulating field normal but broad.	Lateral lobes broad with well indicated and broad humeral sinus.
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GROUP E. (*concinnum*, *fulvum*)

Cerci elongate, thickened, tapering, tooth proximal and directed distinctly proximad.	Ovipositor moderately falcate, of variable length.	Stridulating field normal.	Lateral lobes with humeral sinus indicated quite distinctly and rather broadly.
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GROUP F. (*militare*)

Cerci very elongate, incrassate, tapering, apex slightly incurved, tooth decidedly proximad and directed distinctly proximad.	Ovipositor straight, subequal in depth, elongate.	Stridulating field normal.	Lateral lobes with humeral sinus very shallowly indicated.
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Stenorhoptrum new subgenus

GROUP G. (*volantum*, *bradleyi*)

Cerci elongate, thickened, tapering, tooth proximal and directed nearly at a right angle or decidedly curved and extending proximad in direction.	Ovipositor with ventral margin straight proximad or gently arcuate, dorsal margin straight.	Stridulating field of male tegmen narrow, with speculum greatly elongate.	Lateral lobes with humeral sinus moderately indicated, and broad but shallow.
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Metarhoptrum new subgenus

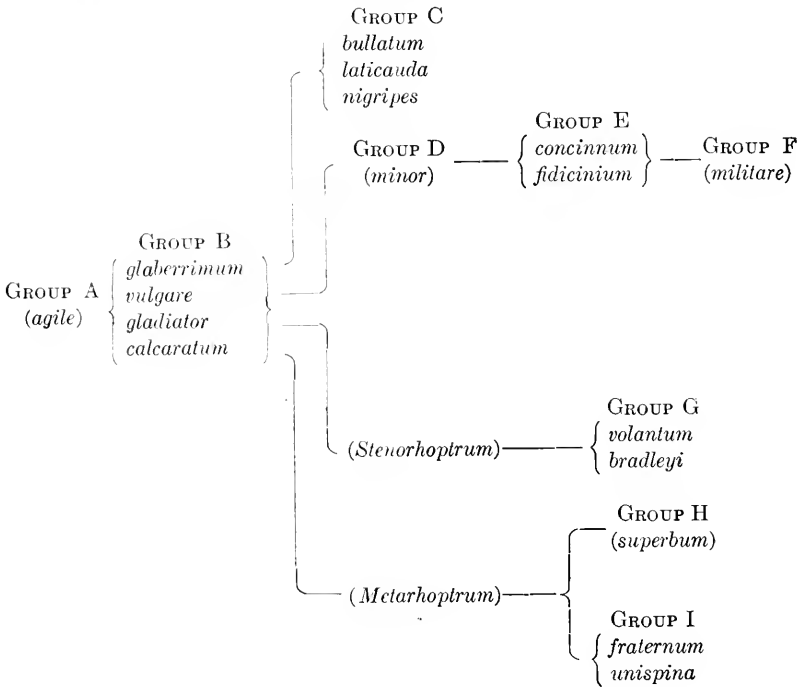
GROUP H. (*superbum*)

Cerci much as in <i>bradleyi</i> of Group G but with distal portion heavier and thicker.	Ovipositor ?	Stridulating field of male tegmen narrow but of normal character.	Lateral lobes with no humeral sinus.
	Genicular lobes of caudal femora unispinose.		

GROUP I. (*fraternum*, *unispina*)

Cerci with distal extremity tapering, tooth nearly median, not heavy, directed weakly proximad.	Ovipositor ?	Stridulating field small, stridulating vein very weak.	Lateral lobes with at most only a very shallow humeral sinus.
	Genicular lobes of caudal femora unispinose.		

The probable relationship of these groups can be best expressed diagrammatically as shown herewith.



Group A is probably the most primitive member of the genus, as it certainly is the simplest type. Group B is less homogeneous than most of the other groups but its specific units are unquestionably of a common origin. While *gladiator* and *calcaratum* show a somewhat analogous development of the tooth of the male cercus and of the lateral lobes of the pronotum, it is also very evident that *gladiator* is in certain respects closer to *vulgare*, *i. e.*, in the presence of the peculiar node on the dorsal face of the male cercus and in the general character of the tegmina, while the ovipositor of *gladiator* in general type suggests more relationship to *glaberrimum*, which, however, has many features of difference. Taken as a whole the four members of the group are closely related in sum total of characters but specifically divergent in certain single characters. Group C is somewhat similar in complexion to group B but the relationship of *bullatum* and *laticauda* is close and *nigripes* is a divergent type, the peculiar

adpressed character of the cercal tooth giving it a rather unique position, although in general its relationship to the other two species is readily perceived. This group (C) is quite divergent from group B, its probable ancestral type. Group D is probably a link connecting groups B and E, but distinct enough in character from either of these to be given an independent position. In Groups E and F the elongation of the cercus is progressively pronounced, much resembling that found in one species of Group G and one of Group I, which, however, are members of other phyla of the genus. The ovipositor in these groups shows the extreme development of the elongate arcuate type. Group F was apparently derived from a Group E-like ancestor, and in it we find the extreme development of the cercus in elongation (equalled in *unispina* of Group I), this also being gently inbowed distad, the tooth proximal and distinctly directed proximad, while the ovipositor is straight and elongate. Group G is very distinct in character, being sharply defined by the peculiarity of the speculum of the male tegmina, and the straight dorsal margin of the ovipositor (this in *volantum* resembling that of *gladiator* of Group B, but this is probably due to convergence caused by the use of similar oviposition sites). In this group (G) the cercus is elongated, the tooth is distinctly proximal, although the direction of the tooth is different in the two included species. Group H occupies a peculiar position, showing a number of features of relationship to Group I and some apparently superficial resemblance to Group G, but the greater affinity is with Group I. Group I shows a decided tendency toward *Conocephalus*, but in general it is distinctly a member of the genus *Orchelimum*. The unispinose caudal genicular lobes of the species of Groups H and I readily separate them from those of the other groups. Group I has its extreme condition in *unispina* with its obsolete humeral sinus.

Key to the Species

The following key is largely artificial, particularly in the female sex, but it will be found to separate the majority of the species with little difficulty. Some few forms which are easily distinguishable in the male are difficult to separate in the opposite sex and vice versa. In case any difficulty is encountered in forming

a clear idea of the differential features of a certain form or forms, we would suggest that the figures given in this paper for the species involved be examined. With the aid of the figures we feel that proper identification can readily be made.

MALES

A. Cercus of average length, portion distad of insertion of median tooth not markedly longer than that proximad of same. General form relatively more robust.

B. Tooth of cercus distinctly longer than distal portion of cercal shaft and greatly produced, decidedly aciculate. (Humeral sinus hardly indicated; ventro-external margin of caudal femora armed.)

calcaratum new species

BB. Tooth of cercus not longer than distal portion of cercal shaft, not decidedly aciculate.

C. Dorsal surface of shaft of cercus without a very decided sinuate carination.

D. Cercus distinctly depressed, tooth particularly so. (Tooth of cercus directed at a right angle to general axis of cercal shaft, also moderately uncinuate at apex. Humeral sinus well indicated.)

agile (DeGeer)

DD. Cercus not distinctly depressed, tooth more or less thickened in its proximal half.

E. Dorsal surface of cercal shaft without a decided elevated "boss" or node between insertion of tooth and apex of shaft. Speculum of stridulating field more decidedly longitudinal (Head more or less reddish.)

glaberrimum (Burmeister)

EE. Dorsal surface of cercal shaft with a decided elevated "boss" or node between insertion of tooth and apex of shaft. Speculum of stridulating field subquadrate.

F. Tooth of cercus as long as distal half of shaft of same, apex of shaft blunt acute. Humeral sinus hardly indicated, ventro-caudal angle of lateral lobes rectangular.

gladiator Bruner

FF. Tooth of cercus not as long as distal half of shaft of same, apex of shaft bluntly rounded. Humeral sinus well indicated, ventro-caudal angle of lateral lobes obtusely rounded.

vulgare Harris

CC. Dorsal surface of shaft of cercus with a very decided sinuate carination.

D. Tooth of cercus not strongly adpressed against proximal portion of sinuate carina. Caudal margin of lateral lobes of pronotum with humeral sinus appreciably indicated and remainder of margin weakly arcuate. Tibiae not blackish.

E. Fastigium relatively broader. Metazona occupying but little less than half of dorsal length of pronotum. Lateral lobes of pronotum relatively shorter, ventro-caudal angle

acute. (Ventro-external margin of caudal femora generally unarmed.)

bullatum new species

EE. Fastigium relatively narrower. Metazona occupying distinctly less than half of dorsal length of pronotum. Lateral lobes of pronotum relatively broader, ventro-caudal angle less acute. (Ventro-external margin of caudal femora with from two to eight spines.)

laticauda Redtenbacher

D. Tooth of cercus strongly adpressed against proximal portion of sinuate carina. Caudal margin of lateral lobes of pronotum with little indication of humeral sinus and remainder of margin distinctly sinuate. All tibiae blackish. (Ventro-external margin of caudal femora armed.)

nigripes Scudder

AA. Cercus moderately elongate or very elongate, portion distad of insertion of median tooth markedly longer than that proximad of same. General form relatively more slender.

B. Apex of cercus not decidedly acuminate. Tooth of cercus in position usual in genus, not dorsal or distinctly ventro-mesad in insertion or not strongly proximad in trend (except in *superbum*, which has the tooth distinctly ventro-mesad in insertion).

C. Lateral lobes of pronotum with no humeral sinus. Genicular lobes of caudal femora unispinose.

superbum new species

CC. Lateral lobes of pronotum with more or less decided humeral sinus. Genicular lobes of caudal femora bispinose.

D. Lateral lobes of pronotum broad, slightly broader than deep. Ventro-external margin of caudal femora always armed. General coloration variegated. (Size small.)

minor Bruner

DD. Lateral lobes of pronotum narrower, not quite as broad as deep. Ventro-external margin of caudal femora very rarely armed. General coloration, except face, more uniform. (Size small to large.)

concinnum Scudder

BB. Apex of cercus decidedly acuminate (except in *superbum*). Tooth of cercus inserted on level with dorsal plane of cercus (*volantum*), diverging from ventro-internal face (*bradleyi* and *unispina*) or directed strongly proximad (*fidicinium*, *militare* and *fraternum*).

C. Speculum of stridulating field less elongate and narrow, but slightly longitudinal.

D. Stridulating area of tegmina of type usual in genus. Dorsal line of pronotum appreciably ascending dorso-caudad on metazona. Genicular lobes of caudal femora bispinose.

E. Lateral lobes of pronotum distinctly deeper than broad. Cercus relatively more slender. Fastigium broader.

militare Rehn and Hebard

EE. Lateral lobes of pronotum as broad as deep. Cercus relatively more robust. Fastigium narrower.

fidicinium Rehn and Hebard

DD. Stridulating area of tegmina of type more characteristic of *Conocephalus*, relatively smaller (except in *superbum*). Dorsal line of pronotum not appreciably ascending dorso-caudad on metazona. Genicular lobes of caudal femora unispinose.

E. Lateral lobes of pronotum relatively narrower, without a distinct humeral sinus.

F. Cercus very attenuate and not flattened distad. Speculum of stridulating field short, rather broad. (Size small.) **unispina** (Saussure and Zehntner)

FF. Cercus not attenuate but thick and somewhat flattened distad. Speculum of stridulating field rather narrow, elongate (not as extreme as in *bradleyi* and *volantum*). **superbum** new species

EE. Lateral lobes of pronotum relatively broader, with a distinct though shallow humeral sinus.

fraternum new species

CC. Speculum of stridulating field decidedly elongate, very narrow, strongly longitudinal.

D. Tooth of cercus diverging on a plane with dorsum of cercal shaft, straight, tapering, slightly proximad in trend; distal portion of cercal shaft regularly tapering, quite acute, not strongly depressed when seen from lateral aspect. **volantum** McNeill

DD. Tooth of cercus diverging from ventro-internal face, projecting distinctly proximad; distal portion of cercal shaft sub-arcuate, moderately acute, strongly depressed when seen from lateral aspect. **bradleyi** new species

FEMALES

Females of *superbum*, *unispina* and *fraternum* are unknown.

A. Dorsal outline of ovipositor wholly or in greater portion straight. (Length of ovipositor always more than one-half that of caudal femur.)

B. Ovipositor not equal to two-thirds of length of caudal femur.

C. Ventral margin of ovipositor regularly arcuate, greatest depth approximately mesad. Ventro-caudal angle of lateral lobes more rounded. **volantum** McNeill

CC. Ventral margin of ovipositor straight for over half its length, proximal half of ovipositor subequal in depth, narrowing on distal half. Ventro-caudal angle of lateral lobes more acute.

bradleyi new species

BB. Ovipositor equal to two-thirds or more of length of caudal femur.

C. Ovipositor very heavy, ensiform, ventral margin arcuate, greatest depth mesad. Humeral sinus not strongly indicated.

gladiator Bruner

CC. Ovipositor narrow, elongate, subequal in depth, both margins straight for greater portion of their length. Humeral sinus strongly indicated. **militare** Rehn and Hebard

AA. Dorsal outline of ovipositor always regularly, but more or less decidedly, arcuate.

- B. Ovipositor less than half as long as the caudal femur.
- C. Ovipositor not deeper at some point distad of base than at base. (Lateral lobes of pronotum narrow.) **agile** DeGeer
- CC. Ovipositor deeper at some point distad of base than at base.
- D. Ovipositor with general form less arcuate.
- E. Lateral lobes of pronotum broader, ventral portion of caudal margin of same considerably arcuate, convex callosity very broad. **glaberrimum** Burmeister
- EE. Lateral lobes of pronotum narrower, ventral portion of caudal margin of same little arcuate, convex callosity comparatively narrower. **concinnum** Scudder (Part)
- DD. Ovipositor with general form more arcuate.
- E. Fastigium more robust. Caudal margin of lateral lobes of pronotum with deeply impressed humeral sinus. Ventro-external margin of caudal femora generally unspined.
- vulgare** Harris
- EE. Fastigium less robust. Caudal margin of lateral lobes of pronotum with but slight indication of humeral sinus. Ventro-external margin of caudal femora always spined.
- calcaratum** new species
- BB. Ovipositor more than half as long as the caudal femur.
- C. Ovipositor strongly falcate.
- D. Caudal margin of lateral lobes of pronotum sinuate or subsinuate ventrad of humeral sinus.
- E. Ventro-cephalic angle of lateral lobes little indicated. Ventro-external margin of caudal femora generally unspined. Tibiae not blackish. **bullatum** new species
- EE. Ventro-cephalic angle of lateral lobes more pronounced. Ventro-external margin of caudal femora spined. Tibiae blackish. **nigripes** Scudder
- DD. Caudal margin of lateral lobes of pronotum gently arcuate ventrad of humeral sinus. (Ventro-external margin of caudal femora with 2 to 8 spines.) **laticauda** Redtenbacher
- C. Ovipositor gently arcuate, never falcate in degree of curvature.
- D. Lateral lobes of pronotum deeper than greatest breadth. Humeral sinus moderately indicated.
- concinnum** Scudder (Part)
- DD. Lateral lobes of pronotum broader than deep. Humeral sinus of average (*minor*) or decided (*fidicinium*) indication.
- E. Ovipositor proportionately deeper, dorsal line straighter. Tegmen more coriaceous. (Coloration variegated.)
- minor** Bruner
- EE. Ovipositor proportionately shallower, dorsal line more arcuate. Tegmen more vitreous. (Coloration more uniform.) **fidicinium** Rehn and Hebard

Specimens Examined.—The total number of specimens listed in the present paper is 2590, of which almost one-half were collected by one or both of the present authors. In addition to the specimens listed in the present paper some hundreds of individuals which had been previously recorded by us were re-examined and used in forming the conclusions here reached by us. These, however, have not been treated in detail but will be found indicated by localities at the end of the individual summaries of material under the species.

The abbreviations used in tabulating specimens will, we feel, be perfectly clear to anyone using the paper, as they are of the general type which we have been uniformly using for some time. The present authors are indicated by their respective initials and the institutions by the initial letters of their names. In the case of other individuals the name is given in full. Specimens collected by the authors which are not indicated as in the collection of the Academy of Natural Sciences of Philadelphia or the Hebard Collection are to be understood as jointly the property of these two collections, between which they are to be divided.

The types of the following forms have been examined in the preparation of the present study.

- O. molossum* Rehn and Hebard = *agile* (DeGeer)
- O. erythrocephalum* Davis = *glaberrimum* (Burmeister)
- O. gladiator* Bruner
- O. calcaratum* new species
- O. bullatum* new species
- O. pulchellum* Davis = *laticauda* Redtenbacher
- O. nigripes* Scudder
- O. minor* Bruner
- O. concinnum* Scudder
- O. longipennis* Scudder = *concinnum* Scudder
- O. gracile* Bruner (*delicatum* Bruner) = *concinnum* Scudder
- O. fidicinium* Rehn and Hebard
- O. crusculum* Davis = *fidicinium* Rehn and Hebard
- O. militare* Rehn and Hebard
- O. bradleyi* new species
- O. superbum* new species
- O. fraternum* new species

In addition to these we have examined authentic material, labelled by the author, of *Orchelimum indianense*, *campestre* and *volantum* Blatchley.

Acknowledgments.—We wish to tender our thanks to Dr. Samuel Henshaw of the Museum of Comparative Zoology, Mr. A. N. Caudell of the United States National Museum, Mr. W. T. Davis of New Brighton, New York, and Prof. A. P. Morse of Wellesley, Massachusetts, for their courtesy in placing at our disposal the material of the genus in the collections under their charge or in their possession. To Mr. Davis, especially, we are under great obligation for not only material but numerous suggestions, as well as copies of important correspondence relative to the identity of certain species of the genus. Any call we have made on him has been cheerfully answered to the fullest extent of his ability.

Orchelimum agile (DeGeer) (Figs. 6, 18, 35, 36 and 69.)

1773. *Locusta agilis* DeGeer, Mém. Hist. Ins., iii, p. 457, pl. 40, fig. 3. [Pennsylvania.]

1839. *Orchelimum glaucum* Serville, Hist. Nat. Ins., Orth., p. 524. [North America.]

1891. *Orchelimum sibiraticum* McNeill, Psyche, vi, p. 26. (February.) [Rock Island, Illinois.]

1891. *Xiphidium (Orchelimum) nitidum* Redtenbacher, Verh. k.-k. zool.-botan. Gesellschaft Wien, xli, pp. 494, 503. (July.) [Georgia.]

1891. *Xiphidium (Orchelimum) spinulosum* Redtenbacher, Ibid., pp. 495, 503. (July.) [North Carolina.]

1907. *Orchelimum molossium* Rehn and Hebard, Proc. Acad. Nat. Sci. Phila., 1907, p. 307, figs. 4 to 6. [Pablo Beach, Florida.]

While previously of the opinion that *agilis* of DeGeer was the same as Harris' *vulgare*,¹¹ we now feel that this view is erroneous and that the name properly belongs to the present species. Analyzing DeGeer's description and comparing it with females of the present species and *vulgare*, we find that in size (*i. e.*, of Pennsylvania material), in the relative length of the ovipositor, which Stål in discussing DeGeer's type says is "femoribus posticis plus dimidio brevior," in the several spines on the caudal femora and in the greenish costal edging of the tegmina the present species is in agreement with the description, while in the same features *vulgare* shows differences. The relative proportions of the head, pronotum and caudal limbs in the original figure are also those of the present species.

The remainder of the above synonymy has been established only after a careful study of the literature involved, typical mate-

¹¹ Proc. Acad. Nat. Sci. Phila., 1910, p. 640, (1911).

rial of *molossus* and the extensive representation of this species now in our hands. The description of *silvaticum* is brief and unsatisfactory, only non-essential characters being mentioned, but there is sufficient in the way of proportions and remarks on the relationship, supplemented later by McNeill's key, to enable us to place the name with some degree of certainty. In the synonymizing of *molossus* and *nitidum* we are compelled to reverse our previous definition of the latter¹², which name we formerly considered to belong to the species later named *pulchellum* by Davis, and for which we here use Redtenbacher's name *laticauda*. This reversal we feel is warranted, as we are now able to state that the species to which we then applied the name *nitidum* was before Redtenbacher when he described the latter and formed the basis of his *laticauda*. By changing our views we must place *molossus* in the synonymy. The name *spinulosum* was based on small, shorter winged individuals of *nitidum*, which had the dorsum of the pronotum infuscate or possessed paired pronotal bars, while the typical material of *nitidum* was unicolorous on the pronotum. This more or less varied infuscation of the dorsum of the pronotum with additional dark bars means nothing of diagnostic value in this or several other species of the genus, while our series shows greater range in general size and tegminal proportions than given in the descriptions of *nitidum* and *spinulosum* by Redtenbacher.

In size we find a general, or rather average, increase southward. In using the word "southward" it should here be qualified in meaning to designate the Austroriparian element which extends northward along the low coastal region, instead of mere southern latitude. However, this average southern increase is not invariable, as in numerous series, such as those from Tinicum, Lake Waccamaw, Tybee Island, Jacksonville, Ortega and Atlantic Beach, we find very considerable individual variation. In addition, local, probably environmental, factors seem to influence size, as the Atlantic Beach series averages appreciably smaller than the Jacksonville representation, while the Wrightsville and Tybee Island salt marsh specimens are as a whole decidedly smaller than specimens from the comparatively close localities of Winter Park and Cumberland Island respectively.

¹² Proc. Acad. Nat. Sci. Phila., 1907, p. 306, (1907).

Individuals with greatly produced tegmina and wings crop out unexpectedly in several of the series, there being one from Philadelphia, one from Cornwells, Pennsylvania, several from Washington, a number from Virginia, one from Raleigh, one from Wilmington, North Carolina, several from Winter Park, North Carolina, one from Albany, Georgia, and one from Live Oak, Florida.

The number of spines on the distal portion of the ventro-external margin of the caudal femora was found on the examination of thirty indiscriminately selected individuals in the largest series, *i. e.* that from Tinicum, Pennsylvania, to vary from 0 to 5. The exact figures are as follows: 0 and 3 spines, 1 specimen; 1 and 3 spines, 2 specimens; 2 and 2 spines, 3 specimens; 2 and 3 spines, 7 specimens; 3 and 3 spines, 10 specimens; 3 and 4 spines, 3 specimens; 3 and 5 spines, 1 specimen; 4 and 4 spines, 2 specimens; 4 and 5 spines, 1 specimen.

From this it is seen that in half the total the number of spines on the same margin of the caudal femora agrees, while in an equal number there is a more or less marked discrepancy. Very marked discrepancy is, apparently, not as frequent as a discrepancy of a single spine.

In the coloration of the dorsal surface of the head and pronotum we find every conceivable transition between one with that surface of the clear glass greenish of the lateral aspects and of the tegmina, to the other extreme with paired diverging dark brownish lines extending caudad at least to the principal transverse sulcus, between which lines the dorsum is more or less infuscate, occasionally so much so that these bordering lines are distinguished with difficulty.

Distribution.—Coastal Plain and adjacent portion of the Piedmont Region of the eastern states from as far north as southeastern Pennsylvania (Collegeville, Cornwells, Chestnut Hill, Philadelphia and Tinicum) and southern New Jersey (north as far as Westville and Ventnor) south to southern Florida, west as far as south-central Kansas (Wichita; Isely), Arkansas and the Mississippi Valley section of Louisiana (Buras and Milneburg), and north in the Mississippi Valley at least as far as northern Illinois (Rock Island; McNeill) and west central Indiana (Vigo County; Blatchley).

Specimens Examined: 519; 280 ♂, 231 ♀, 2 juv. ♂, 6 juv. ♀.

Collegeville, Pennsylvania, IX, 21 and 22, 1909, (H. Fox; meadow), 3 ♂, 8 ♀, [A. N. S. P.].

Cornwells, Pennsylvania, X, 1906, (R. & H.; in meadow land), 1 ♂, 1 ♀; IX, 7, 1914, (H.; in vegetation along river and in marsh), 17 ♂, 16 ♀.

Chestnut Hill, Pennsylvania, IX, 18, 1903, (H.), 4 ♂, 4 ♀.

Adingham, Pennsylvania, VIII, 8, 1914, (D. E. Culver), 1 ♂, 1 ♀, [A. N. S. P.].

Philadelphia, Pennsylvania, (Westcott), 1 ♀, [Hebard Cln.].

Gibson's Point, Philadelphia, Pennsylvania, VIII, 11, 1910, VIII, 19, 1911, (H. Fox), 13 ♂, 3 ♀, [A. N. S. P.].

Tinicum, Pennsylvania, VIII, 13, 1911, IX, 29, 1903 and 1913, IX, 9, 1904, (R. & H.; in meadow land), 71 ♂, 53 ♀.

Westville, New Jersey, VIII, 31, 1899, (G. M. Greene), 2 ♀, [A. N. S. P.].

Jericho, New Jersey, IX, 6, 1910, (H. Fox; in marsh), 1 ♂, 2 ♀, [A. N. S. P.].

Ventnor, New Jersey, VIII, 17 and 26, 1914, (H.; grasses and marshy spots as well as grassy clumps on the higher areas), 27 ♂, 20 ♀, 2 juv. ♂, 6 juv. ♀.

Canton, New Jersey, IX, 7, 1910, (H. Fox), 1 ♀, [A. N. S. P.].

Dorchester, New Jersey, IX, 4, 1910, (H. Fox; marsh), 3 ♂, 3 ♀, [A. N. S. P.].

Cedar Springs, New Jersey, VIII, 14 and 26, 1914, (H.; common in fresh marsh grasses and rushes along river), 19 ♂, 20 ♀.

Ocean View, New Jersey, IX, 4 and 6, 1909, (H. Fox; upland meadow bordering salt marsh), 6 ♂ 5 ♀, [A. N. S. P.].

Sea Isle City, New Jersey, VIII, 15, 1910, (H. Fox; in tall grasses and *Cyperis*), 11 ♂, 2 ♀, [A. N. S. P.].

Goshen, New Jersey, VIII, 22, 1910, VIII, 27, 1912, (H. Fox), 4 ♂, 3 ♀, [A. N. S. P.].

Avalon, New Jersey, VIII, 12 and 20, 1910, VIII, 12, 1911, (H. Fox; in sedge in dune depression), 6 ♂, 8 ♀, [A. N. S. P.].

Anglesea, New Jersey, IX, 6, (W. T. Davis) 1 ♂, 1 ♀, [Davis Cln.].

Near Town Bank, New Jersey, VIII, 15, 1912, (W. T. Davis), 1 ♂, [U. S. N. M.].

Erma, New Jersey, VIII, 19, 1912, (W. T. Davis), 1 ♀, [U. S. N. M.].

Cape May, New Jersey, IX, 24, 1910, (H. Fox), 2 ♂, 4 ♀, [A. N. S. P.].

Newcastle, Delaware, VIII, 6, 1911, (H. Fox), 1 ♂, [A. N. S. P.].

Montgomery Co., Maryland, IX, 23, 1911, (W. T. Davis), 1 ♂, 1 ♀, [Davis Cln.].

Chestertown, Maryland, VIII, 25, 1899, (E. G. Vanatta), 1 ♀, [A. N. S. P.].

Cedar Point, Morgantown, Maryland, VIII, 24, 1913, (W. L. McAtee), 1 ♂, 1 ♀, [U. S. N. M.].

Hyattsville, Maryland, IX, 17, 1911, (W. T. Davis), 1 ♂, [U. S. N. M.].

Washington, D. C., IX, 1883, 1 ♂, 3 ♀, [Hebard Cln.]; IX, 3 to 11, (A. N. Caudell), 5 ♂, 3 ♀, [U. S. N. M.]; VII and VIII, 1904 and 1909, (H. A. Allard), 3 ♂, 3 ♀, [U. S. N. M.].

Virginia, VIII, 14, X, 1, 1883, 3 ♂, 9 ♀, [Hebard Cln.].

Rossllyn, Virginia, IX, X, 20, (A. N. Caudell), 4 ♂, 2 ♀, [U. S. N. M.].

Addison, Virginia, X, 6, 1912, (A. N. Caudell), 1 ♂, 1 ♀, [U. S. N. M.].
 Appomattox, Virginia, IX, 6, 1903, (Morse), 3 ♂, 6 ♀, [Morse Cln.].
 Virginia Beach, Virginia, IX, 7, 1903, (Morse), 1 ♂, 1 ♀, [Morse Cln.].
 Hamlet, North Carolina, X, 1906, (F. Sherman), 1 ♀, [N. C. Dept. of Agric.].
 Lake Waccamaw, North Carolina, IX, 8, 1911, (R. & H.; in high weeds near lake shore), 9 ♂, 10 ♀.

Wilmington, North Carolina, VII, 23, 1905, (J. P. Spoon), 1 ♂, [N. C. Dept. of Agric.].

Winter Park, North Carolina, IX, 7, 1911, (R. & H.; in grasses in field), 2 ♂.

Wrightsville, North Carolina, IX, 7, 1911, (R. & H.; in weeds on barrier beach), 1 ♂.

Yemassee, South Carolina, IX, 4, 1911, (R. & H.; in grasses), 1 ♂, 3 ♀.

Thompson's Mills, Georgia, 1908, X, 1909, (H. A. Allard), 2 ♂, 1 ♀, [U. S. N. M.].

Stone Mountain, Georgia, IX, 12, 1913, (J. C. Bradley), 1 ♂, [Ga. State Cln.].

Albany, Georgia, VIII, 1, 1913, (R. & H.; attracted to light at night), 1 ♀.

Hebardville, Georgia, VIII, 28, 1911, (H.) 1 ♂.

Jesup, Georgia, IX, 1, 1911, (R. & H.; in swamp in pine woods), 1 ♂, 1 ♀.

Cumberland Island, Georgia, VIII, 31, 1911, (R. & H.; in weeds on beach), 3 ♂, 1 ♀.

Tybee Island, Georgia, IX, 2, 1911, (R. & H.; scarce in marsh grass), 3 ♂, 2 ♀.

Savannah, Georgia, VIII, 13 to 14, 1903, (Morse), 11 ♂, 8 ♀, [Morse Cln.].

Live Oak, Florida, VIII, 26, 1911, (R. & H.), 1 ♂.

Jacksonville, Florida, (Priddey), 3 ♂: VIII, 1885, (Ashmead), 2 ♂, 2 ♀, [Hebard Cln.].

South Jacksonville, Florida, IX, 28, 1913, (W. T. Davis), 1 ♀, [Davis Cln.].

Ortega, Florida, IX, 6, 1913, (W. T. Davis), 2 ♂, 3 ♀, [Davis Cln.].

Pablo Beach, Florida, IX, 27, 1913, (W. T. Davis), 1 ♂, [Davis Cln.].

Atlantic Beach, Florida, VIII, 24, 1911, (R. & H.; fairly common on high weeds in hammock jungle), 5 ♂, 2 ♀.

Hastings, Florida, VIII, 7 to X, 15, (A. J. Brown), 2 ♂, 4 ♀, [Morse Cln.].

Sanford, Florida, (G. B. Frazer), 2 ♂, [M. C. Z.].

Carrabelle, Florida, VIII, 9, 1903, (Morse), 1 ♂, [Morse Cln.].

Marianna, Florida, VIII, 6, 1903, (Morse) 1 ♂, [Morse Cln.].

Quincy, Florida, X, 27, 1905, (W. A. Hooker), 1 ♂, [U. S. N. M.].

Alabama, 1 ♂, [Hebard Cln.]; 1 ♂, [Morse Cln.].

Chattanooga, Tennessee, VIII, 24, 1903, (Morse), 3 ♂, 4 ♀, [Morse Cln.].

Lafayette, Indiana, X, 14, 1914, (H. Fox), 1 ♀, [Fox Cln.].

Southern Illinois, 1 ♀, [M. C. Z.].

Arkansas, 1 ♀, [U. S. N. M.].

Milneburg, Louisiana, VII, 22, 1905, (Morse), 7 ♂, 9 ♀, [Morse Cln.].

Buras, Louisiana, VII, 23, 1905, (Morse), 1 ♂, [Morse Cln.].

We have also recorded this species from Thomasville, Georgia, as *nitidum*; from Pablo Beach, Gainesville, Lakeland and Everglade, Florida, Edenton, Newbern and Raleigh, North Carolina and Rosslyn, Virginia, as *molossus*

and from Raleigh, North Carolina, and Chestnut Hill and Tinicum, Pennsylvania as *spinulosum*.

Orchelimum glaberrimum (Burmeister) (Figs. 7, 19, 37, 38 and 70.)

1838. *X[iphidium] glaberrimum* Burmeister, Handb. der Entom., ii, abth. ii, pt. 1, p. 707. [Georgetown, South Carolina.]

1839. *Orchelimum cuticulare* Serville, Hist. Nat. Ins. Orth., p. 523. [No locality.]

1905. *Orchelimum erythrocephalum* Davis, Canad. Entom., xxxvii, p. 288. [Lakehurst, Toms River and "Ocean Co.," New Jersey.]

We have traced out the movements of Zimmermann, who collected the material on which Burmeister founded the species, and find that Georgetown, South Carolina, is the only locality which he had visited in "South Carolina" up to the time Burmeister's work appeared. Accordingly we have selected that place as the type locality. An effort to locate the original material has been unsuccessful, the only thing positive being the assurance from Prof. O. Taschenberg that it does not exist in the Halle collections.

Regarding the synonymy of *cuticulare* with the present species, a careful study of the description of Serville's species shows conclusively that they are the same. The name *cuticulare* has been erroneously used by Redtenbacher for a species which we are here naming *calcaratum*. The lack of appreciation by some European workers of American geography and the settlement of the country is evidenced by the reference of a form described as long ago as 1839, to a species found only in a region which up to that time was largely the proverbial howling wilderness, traversed only by pioneers and strong government detachments.

Mr. Davis has been kind enough to place in our hands an extensive series of New Jersey, North Carolina and Florida specimens of this species, those from the first mentioned state being typical of his *erythrocephalum*. These confirm the previously expressed opinion of the authors regarding the synonymy of the two forms. The smaller size of the New Jersey specimens is explained when a series representing localities extending from that state to Florida is laid out, as the increase in size southward is in general regular, with, however, the usual amount and percentage of individual variation found in forms of this genus. Environment also is without doubt an influencing factor in regard to size. In no

case, however, is a New Jersey specimen as large as the average North Carolina individual.

As an index to the average amount of this geographic size variation we here present the proportions (in millimeters) of representative pairs of average dimensions for the series from that locality.

	Lakehurst, New Jersey		Fayetteville, North Carolina		Florence, South Carolina	
	♂	♀	♂	♀	♂	♀
Length of body.....	20.2	22.5	25	23.2	25.5	24.7
Length of pronotum.....	5.9	5.9	6.5	6.5	6.8	7
Length of caudal femur.....	17.3	18	19.8	20.5	20	21
Length of ovipositor.....	.....	9.2	.....	10.2	.....	10
	Billy's Island, Georgia		South Jackson- ville, Florida			
	♂	♀	♂	♀		
Length of body.....	22.5	27	24	23.2		
Length of pronotum.....	7	7.3	8	7.5		
Length of caudal femur.....	21	21.8	23.3	22		
Length of ovipositor.....	.....	10	.....	10		

The body length is, as usual, unreliable on account of the frequent unnatural compression or extension.

The length of the tegmina and wings is as variable in this species as in *vulgare*, the caudate type of tegmen and wing appearing in any extensive series. We have before us specimens with the tegmina and wings considerably surpassing the apices of the caudal femora from Lakehurst, Chatsworth, Jamesburg, Parkdale and Atsion, New Jersey; Bayville, Virginia; Fayetteville and Lake Waccamaw, North Carolina; Florence and Yemassee, South Carolina; Albany, Groveland, Thomasville, Billy's Island, Tybee Island and Jesup, Georgia, and Jacksonville, South Jacksonville, Pablo Beach, La Grange and Cedar Keys, Florida.

An examination of one hundred and eleven specimens for the presence or absence of spines on the ventro-external margin of the caudal femora gives figures which support our former contention¹³ regarding the variability of this feature. We are able here to go more fully into this matter and present details of the spine count. Twenty-one New Jersey specimens bear no spines on this margin, while fifty-three have one or more spines. Of this fifty-three, the combinations of spines and number for each are given below with the figures for series from four other localities.

¹³ Proc. Acad. Nat. Sci. Phila., 1910, p. 639. 1911.

	Various New Jersey localities	Raleigh, North Carolina	Florence, South Carolina	Billy's Island, Georgia	South Jackson- ville, Florida
0-0	21	1	3	2	1
0-1	8	2	0	2	1
0-2	7	0	0	0	0
0-3	1	0	0	0	0
1-1	7	0	1	2	1
1-2	9	0	2	1	0
1-3	3	0	1	1	1
2-2	7	0	0	1	3
2-3	6	1	1	1	2
2-4	0	1	0	0	0
3-3	0	1	0	0	0
3-4	4	0	0	0	2
3-5	0	1	0	0	0
3-6	0	1	0	0	0
4-4	1	0	0	0	0

In forty-two specimens from Lakehurst, New Jersey, we find thirty-two with the external margin of the caudal femora with one or more spines and ten without spines.

The red or reddish coloration of the head is almost invariably well marked in northern (*i. e.*, New Jersey) specimens, but in material from the southern portion of the range of the species this is not as decidedly indicated, being often of a paler shade, although occasionally individuals are just as highly, or rather deeply, colored as New Jersey specimens.

Distribution.—As shown by material before us, the range of this species extends over the greater portion of the Coastal Plain of the eastern United States from north-central New Jersey (Old Bridge, Helmetta and Jamesburg) south to southern Florida, inland at least as far as the western edge of the Pine Barren region in New Jersey, in North Carolina as far as Raleigh and in Georgia extending at least as far inland as Macon. Westward along the Gulf Coast we know the species ranges at least as far as $\frac{1}{2}$ southern Mississippi. Redtenbacher has also recorded it from Tennessee, Missouri, Texas and "Rocky Mountains, Colorado," the last certainly in error and the others possibly so. Ashmead has recorded *glaberrimum* from Utica, Mississippi and Allard credits it to Thompsons Mills, Georgia, but in the former case there may be some confusion with long-winged *vulgare*, and in the latter we find from the material this to be the case, so it seems most advisable to base our summary of the geographic

range of the species solely on the specimens examined by us. For comments on other records of *glaberrimum* see under the distribution of *vulgare*.

Specimens Examined: 247, 191 ♂, 48 ♀, 4 juv. ♂, 4 juv. ♀.

Ocean County, New Jersey, VIII, 25, 1 ♀, [Davis Cln.].

Lakehurst, New Jersey, VII, 16 to 30, VIII, 15 to 22, IX, 4 to 24, X, 18, (W. T. Davis), 40 ♂, 4 ♀, [Davis Cln.]. *Paratypes of Orchelimum erythrocephalum* Davis.

Jamesburg, New Jersey, VIII, 11, IX, 19 to 20. (W. T. Davis), 10 ♂, [Davis Cln.].

Old Bridge, New Jersey, X, 8, 1909, (W. T. Davis), 1 ♂, [Davis Cln.].

Cassville, New Jersey, VIII, 1910 (W. T. Davis), 2 ♂, [Davis Cln.].

South of Cassville, New Jersey, VIII, 12, 1911, (W. T. Davis), 1 ♂, [Davis Cln.].

Whitesville, New Jersey, VIII, 22, 1912, (W. T. Davis), 3 ♂, [Davis Cln.].

Chatsworth, New Jersey, VIII, 14 to 21, 1912, (W. T. Davis), 12 ♂, 2 ♀, [Davis Cln.].

High Bridge, Ocean County, New Jersey, VIII, 12, 1911, (W. T. Davis), 1 ♂, [Davis Cln.].

Toms River, New Jersey, VIII, 15, 1885. (W. T. Davis), 2 ♂, [Davis Cln., and Hebard Cln.].

Brown's Mills Junction, New Jersey, VIII, 4, 1905, (E. Daecke), 1 ♂, [Hebard Cln.].

Atsion, New Jersey, VII, 3, 1911, X, 8, 1903, (R. & H.), 1 ♂, 1 ♀, [Hebard Cln.]; VIII, 14, 1911, (W. T. Davis), 1 ♂, [Davis Cln.].

Parkdale, New Jersey, VII, 30, 1911, (R. & H.), 2 ♂, 1 ♀.

May's Landing, New Jersey, VIII, 26 and 29, 1914. (H.; moderately common in marshy area, singing loudly in afternoon, scarcely at all after dark), 15 ♂.

Reega, New Jersey, VIII, 20 and 29, 1914. (H.; in high grass in open glade in pine woods, immature individuals found on first date), 4 ♂, 1 ♀, 1 juv. ♀.

Between Woodbine and Belleplaine, New Jersey, VIII, 21, 1912, (H. Fox), 1 ♂, [A. N. S. P.].

Belleplaine, New Jersey, VIII, 21, 1912, IX, 2, 1909, (H. Fox; grassy area in pine woods), 3 ♂, [A. N. S. P.].

Great Cedar Swamp near Sea Isle Junction, New Jersey, VII, 29, 1911, VIII, 27, 1910, X, 15, 1910, (H. Fox), 15 ♂, [A. N. S. P.].

Cedar Swamp Bog, two miles east of North Dennisville, New Jersey, VIII, 18, 1908, (H. Fox), 1 ♂, [A. N. S. P.].

Virginia Beach, Virginia, IX, 7, 1903, (Morse), 1 ♀, [Morse Cln.].

Cape Henry, Virginia, IX, 7, 1903, (Morse), 1 ♀, [Morse Cln.].

Raleigh, North Carolina, X, 3 ♂, 7 ♀, [Davis Cln.].

Goldsboro, North Carolina, VII, 25, 1913, (R. & H.), 1 juv. ♂.

Fayetteville, North Carolina, IX, 9, 1911, (R. & H.; common in grasses and weeds), 1 ♂, 4 ♀.

Lake Waccamaw, North Carolina, IX, 8, 1911, (R. & H.), 2 ♂.

Wilmington, North Carolina, IX, 8, 1911, (R. & H.; in boggy area where Venus-fly-trap (*Dionca*) grew), 1 ♂, 1 ♀; VIII, 1, (G. P. Engelhardt), 1 ♂, [Davis Cln.].

Wrightsville, North Carolina, IX, 7, 1911, (R. & H.; in oak scrub), 1 ♂.

Smithville, North Carolina, XI, 22, 2 ♂, [M. C. Z.].

Florence, South Carolina, IX, 6, 1911, (R. & H.; in open space with high grass), 5 ♂, 3 ♀.

Ashley Junction, South Carolina, VIII, 15, 1913, (R.; in wet spots in pine woods), 1 juv. ♀.

Yemassee, South Carolina, IX, 4, 1911, (R. & H.; in green grasses along railroad), 3 ♂.

Denmark, South Carolina, VIII, 15, 1903, (Morse), 1 ♂, 1 ♀. [Morse Cln.].

Macon, Georgia, VII, 30 to 31, 1913, (R. & H.), 3 juv. ♂, 1 juv. ♀.

Tybee Island, Georgia, IX, 2, 1911, (H.; in high grasses along edge of tidal marsh), 2 ♂.

Savannah, Georgia, VIII, 14, 1903, (Morse), 4 ♂, 2 ♀, [Morse Cln.].

Groveland, Cannoche River, Georgia, VIII, 28, 1913, (J. C. Bradley), 1 ♂, [Ga. State Cln.].

Jesup, Georgia, IX, 1, 1911, (H.; in swamp in pine woods), 2 ♂, 1 ♀.

Billy's Island, Georgia, IX, 1 to 5, 1913, (J. C. Bradley), 10 ♂, 1 ♀.

Homerville, Georgia, VIII, 27, 1911, (R. & H.), 1 ♂.

Albany, Georgia, VIII, 1, 1913, (R. & H.; in tangles), 1 ♂.

Atlantic Beach, Florida, VIII, 24, 1911, (R. & H.; in marshy land on edge of hammocks), 1 ♂.

Pablo Beach, Florida, IX, 5, 1913, (W. T. Davis), 1 ♂, [Davis Cln.].

South Jacksonville, Florida, IX, 7 and 28, 1913, (W. T. Davis), 11 ♂, 2 ♀, [Davis Cln.].

Hastings, Florida, VIII, 7 to X, 15, (A. J. Brown), 16 ♂, 11 ♀, [Morse Cln.].

La Grange, Florida, IX, 9 & X, 1913, (W. T. Davis), 2 ♂, 1 ♀, [Davis Cln.].

Alabama, 1 ♂, 1 ♀, [Morse Cln.].

Flomaton, Alabama, VIII, 2, 1903, (Morse), 1 ♂, [Morse Cln.].

Nugent, Mississippi, VII, 20, 1905, (Morse), 1 ♀, 1 juv. ♀, [Morse Cln.].

Biloxi, Mississippi, VII, 19, 1905, (Morse), 1 ♂, [Morse Cln.].

Gulfport, Mississippi, VII, 18, 1905, (Morse), 1 ♂, [Morse Cln.].

In addition to these records Smith has reported the species from Tuckerton, New Lisbon and Lahaway, New Jersey; while the present authors have recorded specimens from Bayville, Virginia; Newbern and Winter Park, North Carolina; Thomasville and Waynesville, Georgia, and San Pablo, Jacksonville. Gainesville, Cedar Keys and Everglade, Florida. The present authors' record from Edenton, North Carolina, refers to *vulgare*, under which species it is corrected. Fox has erroneously recorded this species from Rockville, Pennsylvania, the material being *vulgare*, and from between Winslow and Folsom, New Jersey, the latter specimens belonging to our new *superbum*.

***Orchelimum vulgare* Harris (Figs. 8, 20, 39, 40 and 71.)**

1841. *Orchelimum vulgare* Harris, Ins. Inj. Veget., p. 130. [Massachusetts.]

This species is very closely related to *O. glaberrimum* (Burmeister), but while the present form ranges over the Carolinian,

Transition and portions of the Canadian life zones, *glaberrimum* is chiefly restricted to the Austroriparian zone. The ranges of the two touch and possibly to a slight degree overlap, but there is no definite intergradation of the material, typical individuals of each occurring side by side at certain localities on the meeting ground of the two species.

The great difficulty in the past with these two names (*i. e.*, *glaberrimum* and *vulgare*) has been due to the failure of authors to comprehend the real characters separating them. Large specimens of *vulgare* and individuals of the same with caudate tegmina and wings were called *glaberrimum* regardless of the good structural characters which separate the two. All the *glaberrimum* records from the normal range of *vulgare* are probably these long-winged *vulgare*, but those records from the line where the species meet cannot be assigned without examination of the original material.

The general characters separating the two species are: the generally larger, frequently much larger, size of *glaberrimum*, the relatively broader and shallower fastigium of the same form, the broader lateral lobes of the pronotum of *vulgare*, the generally more elongate speculum of the stridulating field of the male tegmina of *glaberrimum*, the preapical node on the dorsal surface of the male cercus in *vulgare*, this being absent in *glaberrimum*, and the straighter and less falcate ovipositor of the female of *glaberrimum*.

In general size *vulgare* holds rather small northward, material from the more southern localities averaging larger, this being quite noticeable in specimens from North Carolina, Missouri, south-central Kansas, Oklahoma and Texas localities. However, like the other forms of this genus, individual variation at any one place is very considerable, and in series averaging large we will find small or medium sized individuals and vice versa. In no case, however, does this species reach the great size frequently attained by *glaberrimum*.

Individuals with elongate tegmina and wings, *i. e.*, these very considerably exceeding the tips of the caudal femora, occur in the material before us from all over the range of the species. The localities represented by this phase in the series before us are: North Saugus and Seekonk, Massachusetts; Port Allegany and Rockville, Pennsylvania; Delaware; Chestertown, Maryland;

Washington, District of Columbia; Virginia; Grant County, West Virginia; Linville, North Carolina; Thompsons Mills, Georgia; Indiana; Illinois; Clarksville, Tennessee; St. Louis, Missouri; Iowa City and Dallas County, Iowa; West Point, Kearney, Lincoln and Neligh, Nebraska; Topeka, Barber County, Hiawatha and Belpre, Kansas, and Dallas, Texas.

An examination of the series before us shows that normally the ventro-external margins of the caudal femora are unspined in this species, only occasional specimens having one or two spines. Forty-eight specimens from five representative localities show counts as follows:

Saunderstown, Rhode Island		Tinicum, Pennsylvania		Sulphur Springs, North Carolina		St. Louis, Missouri		West Point, Nebraska	
0-0	0-0	0-0	0-0	2-2	0-0	0-0	0-0	0-0	0-0
0-0	0-0	0-0	0-0	0-0	0-0	0-0	0-1	0-0	0-0
0-0	0-0	0-0	0-0	0-0	0-0	0-0	0-1	1-1	0-0
0-0	0-0	0-0	0-0	0-0	0-0	0-0	0-0	0-0	0-0
0-0		0-0	0-0	0-0		0-0	0-0	0-0	0-0

*Distribution*¹⁴.—Extending from southern Maine (Norway; Smith), southern Quebec (Montreal; Caulfield), the Muskoka region of Ontario (Walker), north shore of Lake Superior (Caulfield) and Minnesota (Lugger), south in the east as far as northern Georgia (Thompsons Mills; Allard), north of the Carolinas extending eastward to the coast, in the Carolinas east as far as Raleigh (Brimley) and Edenton, in the interior south to at least Tennessee, northwest Arkansas (Fayetteville) and northeast Texas (Dallas), west to the foot of the Rocky Mountains in Colorado (Manitou) and eastern Wyoming (Thomas). Certainly the majority of the *glaberrimum* records from this region refer to long-winged *vulgare*, except in the Pine Barrens of New Jersey where *glaberrimum* reaches its northern limit, while it is possible some of the interior records refer to *gladiator* and *calcaratum*. The record of this species from Chokoloskee, Florida, by the present authors is erroneous, the material having been from elsewhere.

Specimens Examined: 467; 248 ♂; 195 ♀; 10 juv. ♂; 14 juv. ♀.

Montreal, Quebec, Canada, (Lyman), 1 ♀, [M. C. Z.]

Windsor, Ontario, Canada, IX, 1894, 3 ♂, [Cornell Univ.].

¹⁴Owing to the great confusion previously existing between the present species and *O. glaberrimum*, we are here considering as trustworthy only such records as our material gives reason to believe are correct.

- Brunswick, Maine, IX, 2, 1913, (Morse), 1 ♂, [Morse Cln.].
 Norway, Maine, (S. I. Smith), 4 ♂, 2 ♀, [M. C. Z.].
 Vermont, 2 ♂, 1 ♀, [M. C. Z.].
 Jaffrey, New Hampshire, IX, 5 to 18, 1896, (S. Henshaw), 4 ♀, [M. C. Z.].
 Seabrook, New Hampshire, (A. A. Eaton), 1 ♂, [U. S. N. M.].
 Cape Cod, Massachusetts, 1 ♂, 1 ♀, [M. C. Z.].
 Provincetown, Massachusetts, 1 ♀, [M. C. Z.].
 Chatham, Massachusetts, VIII, 1904, (Morse), 2 ♀, [Morse Cln.].
 Seekonk, Massachusetts, (Mrs. Brigham), 1 ♂, [M. C. Z.].
 North Saugus, Massachusetts, IX, 6, 1906, (C. C. Gowday), 1 ♀, [U. S. N. M.].
 Truro, Massachusetts, IX, 4, 1904, (Morse), 1 ♂, [Morse Cln.].
 Vicinity of Boston, Massachusetts, (Scudder), 1 ♀, [M. C. Z.].
 Wollaston, Massachusetts, VII, 1896, VIII, 1895, (F. H. Sprague), 2 ♂, 4 ♀, [M. C. Z.].
 Wellesley, Massachusetts, VII, 18, 1892, (Morse), 1 ♂, [Hebard Cln.].
 Sharon, Massachusetts, VIII, 1, 1897, (F. H. Sprague), 1 ♂, [M. C. Z.].
 Marion, Massachusetts, VIII, 1905, (H.), 3 ♂, 1 ♀.
 Nantucket, Massachusetts, (Scudder), 5 ♂, 3 ♀, [M. C. Z.].
 Saunderstown, Rhode Island, IX, 3 to 9, 1913, (H.), 5 ♂, 4 ♀.
 Wesquage Beach, Rhode Island, IX, 8 and 10, 1913, (H.), 2 ♀.
 Cattaraugus, New York, IX, 1894, 1 ♂, 3 ♀, [M. C. Z. and Cornell Univ.].
 Clifton Springs, New York, 1 ♂, 3 ♀, [M. C. Z. and Cornell Univ.].
 Ithaca, New York, VII, 27 to 30, 1885, VIII, 4 to 26, 1885, (O. E. Pearce), 19 ♂, 14 ♀, [M. C. Z. and Cornell Univ.]; VIII, 15 and 22, 1890 and 1891, 2 ♂, 1 ♀, [Morse Cln.].
 Berkshire, New York, 1 ♂, [M. C. Z.].
 Mosholu, New York, X, 18, 1 ♀, [Hebard Cln.].
 Port Allegany, Pennsylvania, VIII, 1 to 8, 1904, (H. W. Fowler), 1 ♀, [A. N. S. P.].
 Tobyhanna, Pennsylvania, IX, 2, 1903 (H.), 2 ♂, [Hebard Cln.].
 Blairsville, Pennsylvania, VIII, 27, 3 ♂, 4 ♀, [Penna. State Dept. Zool.].
 Diamond Valley, Huntington Co., Pennsylvania, IX, 10, 1905, (R.), 1 ♀, [A. N. S. P.].
 Rockville, Pennsylvania, VIII, 5 to 29, 4 ♂, 4 ♀, 1 juv. ♀, [Penna. State Dept. Zool.].
 Camphill, Pennsylvania, IX, 22, 1 ♀, [Penna. State Dept. Zool.].
 Harrisburg, Pennsylvania, VII, 9, VIII, 2 to 18, 4 ♂, 4 ♀, 1 juv. ♀, [Penna. State Dept. Zool.].
 Dauphin, Pennsylvania, IX, 15, 1 ♂, 1 ♀, [Penna. State Dept. Zool.].
 Middletown, Pennsylvania, X, 19, 1 ♂, [Penna. State Dept. Zool.].
 Highspire, Pennsylvania, VII, 28, 1 juv. ♀, [Penna. State Dept. Zool.].
 Perkasio, Pennsylvania, VIII, 4, 1911, (H. Fox), 2 ♂, [A. N. S. P.].
 Cornwells, Pennsylvania, IX, 7, 1914, (H.; scarce in marsh vegetation, common in clumps of weeds in fields), 4 ♂, 1 ♀.
 Devon, Pennsylvania, IX, 14, 1905, 1 ♂, [A. N. S. P.].
 Fern Hill, Pennsylvania, VII, 15, 1911, IX, 19, 1908, (R. & H.), 2 ♂, 1 ♀.
 Castle Rock, Pennsylvania, IX, 19, 1908, (R. & H.), 1 ♂, 4 ♀.

Chestnut Hill, Pennsylvania, IX, 2, 1904, IX, 13 to 18, 1903, (H.), 4 ♂, [Hebard Cln.].

Mount Airy, Pennsylvania, VII, 15, VIII, 4, 1911, (H. Fox), 3 ♂, [A. N. S. P.].

Addingham, Pennsylvania, VIII, 8, 1914. (D. E. Culver), 2 ♂, 1 ♀, [A. N. S. P.]

Gibson's Point, Philadelphia, Pennsylvania, VII, 20, 1911, VIII, 1, 1912, VIII, 9, 1911, (H. Fox), 11 ♂, 4 ♀, [A. N. S. P.].

Tinicum, Pennsylvania, VIII, 13, 1911, IX, 9, 1904, IX, 19, 1908, IX, 29, 1903 and 1913, (R. & H.), 9 ♂, 21 ♀.

Essington, Pennsylvania, VII, 27, 1911, (H. Fox), 1 ♂, 3 ♀, [A. N. S. P.].

Riverton, New Jersey, X, 8, 1911, (H. Viereck), 1 ♀, [A. N. S. P.].

Washington Park, New Jersey, VIII, 11, 1911, (H. Fox), 2 ♂, 2 ♀, [A. N. S. P.].

Clementon, New Jersey, VII, 25, 1911, (H. Fox; in humid field), 1 ♀, [A. N. S. P.].

Canton, New Jersey, IX, 7, 1910, (H. Fox), 1 ♀, [A. N. S. P.].

May's Landing, New Jersey, VIII, 29, 1914, (H.), 2 ♂.

Reega, New Jersey, VII, 31, VIII, 10, 16 and 29, 1914, (H.; in undergrowth in pine woods), 8 ♂, 2 ♀, 1 juv. ♂, 2 juv. ♀, (immature individuals on the two earliest dates).

Pleasantville, New Jersey, VIII, 17, 1914, (H.), 1 ♂.

Ventnor, New Jersey, VIII, 6 and 11, 1914, (H.; in low bushes and heavy weeds and grasses), 6 ♂, 3 ♀, 2 juv. ♂, 2 juv. ♀, (two instars represented, taken on the first date).

Margate, New Jersey, VII, 24, 1914, (H.; in barrier dune vegetation), 2 juv. ♂, 1 juv. ♀, (former in different instars).

Tuckahoe, New Jersey, VIII, 26, 1914, (H.; in glade), 1 ♂.

Cedar Springs, New Jersey, VIII, 14 and 26, 1914, (H.; occasional in fresh-marsh with *agile* and *concinnum*), 3 ♂, 5 ♀.

Ocean View, New Jersey, IX, 7, 1908, (H. Fox), 1 ♂, [A. N. S. P.]; VII, 27, 1914, (H.; common in high grasses and in field), 3 ♂, 1 juv. ♂, 5 juv. ♀, (two instars).

Swainton, New Jersey, VIII, 8, 1914, (H.; occasional, in late afternoon with a low continuous buzzing with but few clicks, a quite different song from that of midday), 2 ♂, 1 juv. ♀.

Cape May Court House, New Jersey, VIII, 21, 1914, (H.; in high cattails and rushes, after dark), 1 ♂.

Wildwood Junction, New Jersey, VII, 27, VIII, 8 and 21, 1914, (H.; in open field), 3 ♂, 2 juv. ♂, 1 juv. ♀, (first adult on second date).

Mount Pleasant, New Jersey, IX, 5, 1904, (H. Fox), 2 ♀, [A. N. S. P.].

Sea Isle Junction, New Jersey, X, 2, 1909, X, 15, 1910, (H. Fox; in swamp), 2 ♂, [A. N. S. P.].

Chestertown, Maryland, VII, 31, 1904, VIII, 22, 1899, (E. G. Vanatta), 2 ♂, [A. N. S. P.].

Washington, District of Columbia, IX, (W. T. Davis, part), 3 ♂, 1 ♀, [Davis and Hebard Clns.]; VIII, 25 to X, 31, (A. N. Caudell), 5 ♂, 4 ♀, [U. S. N. M.].

Virginia, VIII, 14, X, 1, 1883, 1 ♂, 2 ♀, [Hebard Cln.].

- Falls Church, Virginia, IX, 4, 1906, (A. N. Caudell), 1 ♀, [U. S. N. M.].
 Dryden, Virginia, IX, 3, 1899, 1 ♂, [Morse Cln.].
 Norfolk, Virginia, IX, 8, 1903, (Morse), 1 ♂, [Morse Cln.].
 Wytheville, Virginia, IX, 5, 1903, (Morse), 1 ♂, [Morse Cln.].
 Grant County, West Virginia, (Shaler), 1 ♂, [M. C. Z.].
 Kanawha Station, West Virginia, VIII, 23, 1905, (A. D. Hopkins), 1 ♂, [U. S. N. M.].
 Blowing Rock, North Carolina, VIII, 1906, (R. S. Woglum), 1 ♂, [North Carolina Dept. Agr. Cln.].
 Blantyre, North Carolina, IX, 1906, (R. S. Woglum), 1 ♀, [North Carolina Dept. Agr. Cln.].
 Linville, North Carolina, VIII, 30, 1903, (Morse), 1 ♂, 1 ♀, [Morse Cln.].
 Raleigh, North Carolina, X, 10 and 29, 1900, (Sherman), 1 ♂, 1 ♀, [North Carolina Dept. Agr. Cln.].
 Edenton, North Carolina, VIII, 20, 1908, (R.), 2 ♂, [A. N. S. P.]¹⁵.
 Thompson's Mills, Georgia, X, 1909 and 1910, (H. A. Allard), 8 ♂, 2 ♀, [U. S. N. M.].
 Gun Lake, Michigan, VII, 13 to 26, 1912, (M. A. Carriker, Jr.), 3 ♂, 1 ♀, [Hebard Cln.].
 Tuscarawas City, Ohio, IX, 26, 1891, 1 ♀, [M. C. Z.].
 Salineville, Ohio, IX, 4 to 10, 1892, 3 ♀, [Cornell Univ.].
 Indiana, (Blatchley), 2 ♂, 2 ♀, [Hebard Cln.].
 Sedan, Indiana, VIII, 29, 1905, (W. Phillips), 2 ♂, [U. S. N. M.].
 Illinois, (McNeill), 2 ♂, 2 ♀, [Hebard Cln.].
 West Northfield, Illinois, (Kennicott), 1 ♀, [M. C. Z.].
 Urbana, Illinois, IX, 10, X, 17 and 19, 1904, (F. Knab), 1 ♂, 2 ♀, [U. S. N. M.].
 Ogle County, Illinois, (Allen), 1 ♀, (M. C. Z.).
 Peoria, Illinois, VII, 15, 1 ♂, [Cornell Univ.].
 Roan Mountain Station, Tennessee, IX, 3, 1903, (Morse), 2 ♀, [Morse Cln.].
 Chattanooga, Tennessee, VIII, 24, 1903, (Morse), 1 ♀, [Morse Cln.].
 Clarksville, Tennessee, VIII, 15, 1912, (S. E. Crumb), 1 ♂, [U. S. N. M.].
 Ramsey County, Minnesota, 1 ♀, [Hebard Cln.].
 St. Peters, Minnesota, 1880, 1 ♂, [U. S. N. M.].
 Dallas County, Iowa, VIII, 8 to 23, IX, 1 to 3, (Allen), 17 ♂, 12 ♀, [M. C. Z.].
 Denison, Iowa, VII, 20, (Allen), 1 ♂, [M. C. Z.].
 Jefferson, Iowa, VII, 20 to 24, (Allen), 2 ♂, 2 ♀, [M. C. Z.].
 Iowa City, Iowa, (M. P. Somes), 1 ♀, [Hebard Cln.].
 St. Louis, Missouri, IX, 25, 1876, X, 17, 1875, 4 ♂, 1 ♀, [U. S. N. M.].
 Bushberg, Missouri, VIII, 1870, 1 ♀, [U. S. N. M.].
 Kirkwood, Missouri, X, 1877, 1 ♂, [U. S. N. M.].
 Fayetteville, Arkansas, IX, 5, 1905, (Morse), 1 ♂, 1 ♀, [Morse Cln.]; X, 1891, 1 ♂, 1 ♀, [Cornell Univ.].
 Neligh, Nebraska, VIII, (Cary), 1 ♂, [Hebard Cln.].

¹⁵ Previously recorded by us as *O. glaberrimum*: Proc. Acad. Nat. Sci. Phila., 1910, p. 639, (1911).

West Point, Nebraska, VIII, 17 and 19, IX, 1 and 5, (Bruner), 3 ♂, 13 ♀, [Hebard Cln.].

Albion, Nebraska, IX, 14, 1904, (Bruner), 2 ♀, [Hebard Cln.].

Kearney, Nebraska, VII, 27, 1910, (R. & H.), 5 ♂, 1 ♀.

Lincoln, Nebraska, VIII, IX, 3, 1909, X, 1, 1909, (L. Bruner and C. H. Gable), 5 ♂, 4 ♀, [Hebard Cln.].

South Bend, Nebraska, X, 15, 1910, 1 ♂, 2 ♀, [Hebard Cln.].

Weeping Water, Nebraska, IX, 24, 1909, (Bruner), 2 ♀, [Hebard Cln.].

Topeka, Kansas, (F. W. Cragin), 2 ♀, [Hebard Cln.].

Belpre, Kansas, IX, 13, 1909, (H.; stridulating high on tassel of corn), 2 ♂.

Zenith, Kansas, IX, 11, 1907, (H.), 1 ♀.

Hiawatha, Kansas, VIII, (F. B. Isely), 1 ♂, [U. S. N. M.].

Wichita, Kansas, IX, 7, 1904, (F. B. Isely), 1 ♂, 1 ♀, [U. S. N. M.].

Shawnee County, Kansas, (Cragin), 1 ♂, [Hebard Cln.].

Barbe County, Kansas, (Cragin), 1 ♂, [Hebard Cln.].

Wilburton, Oklahoma, VIII, 27, 1905, (Morse), 1 ♂, [Morse Cln.].

Ardmore, Oklahoma, VIII, 18, (F. C. Bishopp), 1 ♂, [U. S. N. M.].

Caddo, Oklahoma, VIII, 8, 1905, (Morse), 1 ♂, [Morse Cln.].

Denison, Texas, VIII, 11, 1905, (Morse), 1 ♀, 1 juv. ♀, [Morse Cln.].

Dallas, Texas, (Boll), 3 ♂, 1 ♂, [M. C. Z.].

Manitou, Colorado, VIII, 1887, 1 ♂, [Hebard Cln.].

The present authors or the senior author alone have previously recorded this species from West Creek and Atsion, New Jersey, and St. Louis, Missouri, as *vulgare*, and from Sulphur Springs and Raleigh, North Carolina, and Montgomery County, Virginia, as *agile*. Rehn has by error reported *vulgare* from Brownsville, Texas (probably *bullatum* but specimen not available), and Rehn and Hebard have credited it to Chokoloskee, Florida. The locality of the latter is unquestionably erroneous.

Orchelimum gladiator Bruner (Figs. 9, 21, 41, 42 and 72.)

1891. *Orchelimum gladiator* Bruner, Canad. Entom., xxiii, p. 71. [West Point, Nebraska.]

1910. *Orchelimum manitobense* E. M. Walker, Canad. Entom., xlii, p. 351, figs. 17 and 18. [Ashdown, Manitoba.]

On comparison of the female type of *gladiator*, now before us, with the available series and the description of *manitobense*, which was based on two males, the above synonymy is clearly evident. The failure of Bruner to mention the form of the lateral lobes of the pronotum, one of the few diagnostic characters shared by both sexes, probably was responsible for Walker's re-description of the species.

The present form has been mistaken by numerous students for *vulgare*, particularly in the male sex, and in consequence there are doubtless in the literature of *vulgare*, many erroneous determinations of material from the region in which both *gladiator*

and *vulgare* occur, which really refer to the present species. Unless the material on which the record is based is in existence there is, however, little probability of these errors being detected and corrected.

In the female sex the very robust ovipositor with a straight dorsal outline will readily separate this form from all the other species of the genus except *volantum*, which, however, has a less robust and less expanded form of the same, although the two species superficially resemble one another in this respect. The form of the cercus in the male sex is very distinctive. The shape of the lateral lobes of the pronotum, and to a lesser degree the shape of the fastigium, will aid in separating both sexes of the present species from *vulgare*.

As a rule this species has the ventro-external margin of the caudal femora unarmed, but in the series before us there are three specimens having a single spine on this margin and a single individual having two spines on the same.

There is an appreciable amount of variation in size in both sexes, but the diagnostic characters are quite constant.

Distribution.—Covering the grassland areas and bottom lands of the northern United States and southern Canada, extending from at least the vicinity of Montreal, southwestern Maine and eastern Massachusetts, west to the eastern slopes of the Cascades in west-central Washington (Ellensburg) and to northern California (Sisson), south as far as southwestern Connecticut (Stamford), southern New Jersey (Winslow Junction), Tennessee, northeastern Kansas (Douglas County), south-central Nebraska (North Platte) and south-central Montana (Billings).

Specimens Examined: 87; 53 ♂, 34 ♀.

Montreal, Quebec, Canada, VII, 15, (Caulfield), 1 ♂, [M. C. Z.].

Norway, Maine, (Smith), 1 ♂, [M. C. Z.].

Montgomery, Vermont, VII, 18, 1891, (Morse), 1 ♂, [Morse Cln.].

Stowe, Vermont, VII, 22, 1891, (Morse), 1 ♀, [Morse Cln.].

White Mountains, alpine and valleys, New Hampshire, (Seudder), 8 ♂, 3 ♀, [M. C. Z.]; IX, 8, 1889, (F. H. Sprague), 1 ♀, [M. C. Z.].

Fancuil Station, Massachusetts, VII, 22, 1892, (Morse), 1 ♂, [Morse Cln.].

Readville, Massachusetts, VII, 21, 1892, (Morse), 1 ♂, 2 ♀, [Morse Cln.].

Stamford, Connecticut, VIII, 22, 1894, (Morse), 1 ♂, [Morse Cln.].

Ithaca, New York, VII, 19, 1904, VIII, 16, 1890, 1 ♂, 1 ♀, [Morse Cln.]; VIII, 4, 1885, 3 ♂, [Cornell Univ.].

Winslow Junction, New Jersey, VII, 8, 1911, (H. Fox; in bog along tracks of Cape May division R. R.), 1 ♂, [A. N. S. P.].

Steuben County, Indiana, VIII, 6 and 8, 1902, (W. S. Blatchley), 2 ♀, [Hebard Cln. and A. N. S. P.].

Marshall County, Indiana, VII, 27 and 29, VIII, 15, 1902, (W. S. Blatchley), 1 ♂, 4 ♀, [Hebard Cln. A. N. S. P. and U. S. N. M.].

Gary, Indiana, VII, 26, 1906, 1 ♂, [Penna. State Dept. Zool.].

Southern Illinois, (Thomas), 1 ♂, [M. C. Z.].

Tennessee, 1 ♀, [M. C. Z.].

Cranmoor, Wisconsin, VIII, 16, 1909, (C. W. Hooker), 1 ♂, [U. S. N. M.].

Dallas County, Iowa, VIII, (Allen) 5 ♂, [M. C. Z.].

Staples, Minnesota, VII, 21, 1909, (H.; in ditch of high weeds), 6 ♂, 14 ♀.

Bismarck, North Dakota, VIII, 9, 1885, 1 ♂, [Hebard Cln.].

Mandan, North Dakota, VII, 25, 1909, (H.; from thistle), 1 ♂.

Glendive, Montana, VII, 23, 1909, (H.; from sage on river plain—extremely shy), 4 ♂, 1 ♀.

Billings, Montana, VII, 28, 1909, (R. & H.; in sedgy area in Yellowstone flood plain), 1 ♂.

North Platte, Nebraska, elev. 2,800 feet, VII, 28, 1910, (R. & H.; in swampy tracts in Platte flood plain), 3 ♂.

West Point, Nebraska, VIII, 1887, IX, 1 (L. Bruner), 1 ♂, 2 ♀, *type* and *paratype*, [Hebard Cln.].

Montana, 1 ♂, [U. S. N. M.].

Olmstead's, near Ellensburg, Washington, VII, 14 to 15, 1882, 1 ♂, [M. C. Z.].

Sisson, California, VII, (Dyar and Caudell), 1 ♂, [U. S. N. M.]; VIII, 29, 1897. (Morse), 1 ♀, [Morse Cln.].

Morse (Canad. Entom., XXXIII, p. 201) and Caudell (Proc. U. S. Nat. Mus., XXXIV, p. 78) have erroneously recorded this species as *O. agile* from Sisson, California, and Scudder (in Hitchcock, Geol. of New Hampsh., I, p. 368) reported it as *O. vulgare* from the White Mountains, New Hampshire, and in similar fashion from the same locality and also from Mt. Greylock, Massachusetts, 3,500 feet (Appalachia, VIII, p. 317). The original material for these references has been examined by us.

Orchelimum calcaratum new species (Figs. 1, 22, 43, 44 and 73.)

1891. *Xiphidium (Orchelimum) cuticulare* Redtenbacher (not of Serville, 1839), Verh. k.-k. zool.-bot. Gesell., Wien, xli, pp. 495, 503. [Texas.]

A member of the same group as *glaberrimum*, *vulgare* and *gladiator*, but differing from all in the greatly elongate tooth of the male cercus, this being distinctly longer than the distal portion of the cercal shaft and aciculate in character, while in the female sex the species can be separated from *vulgare* by the less robust fastigium, by the very slight indication of a humeral sinus and by the always armed ventro-external margin of the caudal femora. The female is readily separable from *glaberrimum* and *gladiator* by the distinctly arcuate ovipositor, as well as by a number of other characters.

Type.—♂; San Antonio, Bexar County, Texas. August 15 to 16, 1912. (Rehn and Hebard.) [Hebard Collection Type No. 164.]

Description of Type.—Size medium (for the genus); form robust; surface moderately polished. Head with the fastigium gently ascending from the level of the occiput, the width of fastigium faintly greater than width of proximal antennal joint, the margins when seen from the cephalic aspect regularly but not strongly converging ventrad; eyes moderately prominent, faintly ovate in basal outline; antennae when in perfect condition nearly four times as long as the body. Pronotum very faintly sellate, this being due to the gently ascending character of the metazona, the line of the prozona nearly straight when seen from the side; greatest caudal width of the metazona contained one and one-third times in the entire pronotal length; cephalic margin subtruncate, caudal margin gently arcuate, metazona about two-thirds the length of the prozona, well separated from the latter by an appreciable transverse sulcus; lateral lobes of pronotum with their greatest dorsal length surpassing their depth, cephalic margin oblique subtruncate, ventro-cephalic angle very broadly rounded, ventral margin strongly oblique truncate, ventro-caudal angle rectangulate, caudal margin gently arcuate, humeral sinus hardly indicated, convex callosity subovate, with pointed extremities and moderately broad. Tegmina not reaching the tips of the caudal femora, in general form resembling those of *vulgare*; stridulating area subequal in extent to the dorsum of the pronotum, stridulating vein transverse, robust. Wings very slightly surpassing the tegmina. Disto-dorsal abdominal segment with the median emargination U-shaped, relatively broad and deep, the flanking processes considerably produced and recurved ventrad; cerci rather heavy, proximal half straight, rounded in form, subcolumnar, median tooth aciculate, placed immediately distad of the middle, elongate, but little shorter than the length of the entire shaft of the cercus, directed inwards and gently falcate distad, subdepressed proximad, distal portion of the shaft of the cercus tapering to a blunt point, depressed; subgenital plate with distal margin subrectangularly emarginate, styles short, subrobust, lateral margins regularly converging to the bases of the styles, venter of plate with distinct paired ridge-like carinae extending cephalad from the base of the styles, a much fainter median carina also present. Caudal femora robust, distal portion rather slender, ventro-external margin armed distad with three to four spines, ventro-internal margin unarmed, genicular lobes bispinose.

Allotype.—♀; Same data as type.

Description of Allotype.—Differing from the description of the type in the following respects. Dorsal line of pronotum nearly straight when seen from the side, not ascending on the metazona; greatest caudal width of metazona contained one and one-half times in entire pronotal length. Ovipositor slightly less than half the length of the caudal femora, regularly falcate, rather broad, ventral margin very faintly serrulate distad, subgenital plate of the form usual in the genus.

Paratypic Series.—We have selected as paratypic a series of twelve males and ten females having the same data as the type and allotype.

	Measurements (in millimeters)					
	♂ Type	♂ Paratype	♂ Paratype	♀ Allotype	♀ Paratype	♀ Paratype
Length of body (in ♀ exclusive of ovipositor).....	19.6	20	23.2	18.3	17.1	20
Length of pronotum.....	6	5.2	6.2	5.8	5.6	6
Length of tegmen....	17	15.7	18.9	17	16.5	18
Length of caudal femur.....	18.2	17	20.8	19.8	19.1	20
Length of ovipositor.....	.....	.....	.....	9.1	9	9.6

Color Notes.—General color light turtle green to olivine, practically pure on the face, sides of the head, lateral lobes of the pronotum, pleura and sides of the abdomen, clearer turtle green on the limbs. Median line on the head, expanding caudad, weak vinaceous-rufous to ochraceous buff, continued over the dorsum of the pronotum and there more or less strongly bordered laterad on the prozona by lines of mahogany red to bay. These stripes gently diverge caudad and occasionally are entirely absent. Tegmina very faint glaucous, more or less weakly tinged with snuff brown on the dorsal aspect, particularly in the female. Stridulating field of male tegmina with three spots of blackish brown on each tegmen, placed in the same position as those found in *vulgare*, *i. e.*, one at base of anal vein, one at apex of arc of the same and the third on the sutural margin near the disto-sutural angle of the speculum. Abdomen of male generally with a broad median area of ferruginous on the dorsum of the apex, this frequently absent. Ovipositor chestnut brown. Eyes walnut brown.

Distribution.—Ranging from the Central Texan region, north to northeastern Kansas (Topeka and Hiawatha) and southeastern Illinois (Olney), extending south to Flatonia and San Antonio, Texas, east to Doucette, Texas, western Arkansas (Fayetteville and Magazine Mountain) and southeastern Illinois, and west to Colorado and west-central Texas (Kerrville).

Biological Notes.—This species is clumsy in its actions and comparatively easy to capture after being located. It was found in a great variety of situations, ranging from high grass to twelve feet above the ground in post oak. It was taken in grass among

cotton, in green weeds, in low bushes and in tall nettles, as well as in bushes in pine woods. The stridulation is not loud.

Morphological Notes.—An analysis of a portion of the series of the present species for constancy of spines on the ventro-external margin of the caudal femora gives the following results: 1-1, 2 specimens; 1-2, 3 specimens; 2-2, 3 specimens; 2-3, 7 specimens; 2-4, 2 specimens; 2-5, 1 specimen; 3-3, 3 specimens; 3-4, 4 specimens; 3-5, 2 specimens; 4-4, 3 specimens; 4-5, 1 specimen; 5-5, 1 specimen. Individuals lacking one caudal limb have not been considered. No specimens have been examined with these margins unspined. In all of the specimens before us the tegmina and wings do not surpass, and in but two instances reach, the tips of the caudal femora.

Synonymy.—Serville's *cuticularis* is clearly not this species but is a synonym of *O. glaberrimum*, the name having been used in error by Redtenbacher, who has been followed by subsequent authors.

Specimens Examined: 85; 42 ♂, 41 ♀, 2 juv. ♀.

Olney, Illinois, (R. Ridgway), 1 ♀, [U. S. N. M.].

Central Missouri, 1 ♂, [U. S. N. M.].

Hiawatha, Kansas, VIII, 1904, (F. B. Isely), 1 ♂, [U. S. N. M.].

Topeka, Kansas (F. W. Cragin), 1 ♂, [Hebard Cln.].

Zenith, Stafford County, Kansas, IX, 11, 1907, (H.), 1 ♂.

Wichita, Kansas, VII, 18, 1904, (F. B. Isely), 1 ♂, 1 ♀, [U. S. N. M.].

Fayetteville, Arkansas, IX, 5, 1905, (Morse), 1 ♂, [Morse Cln.].

Magazine Mountain, Arkansas, 2000 feet elev., VIII, 29, 1905, (Morse), 4 ♂, [Morse Cln.].

South McAlester, Oklahoma, VIII, 7, 1905, (Morse), 1 ♂, [Morse Cln.].

Shawnee, Oklahoma, VIII, 26, 1905, (Morse), 5 ♂, 3 ♀, [Morse Cln.].

Waurika, Oklahoma, X, 12, 1909, (F. C. Bishopp), 1 ♀, [U. S. N. M.].

Colorado, VIII, 1873, 2 ♀, [Morse Cln.].

Denison, Texas, VIII, 11, 1905, (Morse), 1 ♂, 1 ♀, [Morse Cln.].

Dallas, Texas, IX, 25 and 26, 1912, (R. & H.), 1 ♂, 1 ♀, [U. S. N. M.]; IX, 10, 1908, (F. C. Bishopp), 1 ♀, [U. S. N. M.]; (Bolb.), 1 ♂, 7 ♀, 1 juv. ♀, [M. C. Z.].

Plano, Texas, X, 1907, (E. S. Tucker), 1 ♀, [U. S. N. M.].

Weatherford, Texas, IX, 23, 1912, (R. & H.), 2 ♂.

Wichita Falls, Texas, VIII, 15, 1905, (Morse), 2 ♂, 2 ♀, [Morse Cln.].

Temple, Texas, IX, 24, 1912, (R. & H.), 3 ♂.

Terrell, Texas, VIII, 27, 1904, (on cotton), 1 ♀, [U. S. N. M.].

Doucette, Texas, VII, 24, 1912, (H.), 1 ♂.

Flatonia, Texas, VIII, 19 and 20, 1912, (R. & H.), 1 ♂, 5 ♀.

Victoria, Texas, VII, 26 and 27, 1912, (H.), 1 ♀.

San Antonio, Texas, VIII, 15 and 16, 1912, (R. & H.), 14♂, 12 ♀, 1 juv. ♀, *type*, *allotype* and *paratypes*; X, 29, 1905, (F. C. Pratt), 1 ♀, [U. S. N. M.].

Kerrville, Texas, VIII, 17 and 18, 1912, (R. & H.), 1 ♂.

Orchelimum buliatum new species (Figs. 2, 23, 45, 45, 46 and 74.)

1903. *Orchelimum longipenne* Caudell (not *Orchelimum longipennis* Seudder, 1862), Proc. U. S. Nat. Mus., xxvi, p. 806. ["Southern Texas."] (Part.)

A member of the same group as *laticauda* and *nigripes*, but separable from the former by the relatively broader fastigium, by the more extensive metazona of the dorsum of the pronotum and the shorter and marginally more acute lateral lobes of the same, while from *nigripes* the male is readily separated by the less strongly adpressed cercal tooth and the appreciably indicated humeral sinus of the lateral lobes of the pronotum. The female is separated from that of *nigripes* by the less angulate ventro-cephalic angle of the lateral lobes and the generally unspined caudal femora, while from *laticauda* the same sex differs in the sinuate ventral section of the caudal margin of the lateral lobes.

Type.—♂; Galveston, Galveston County, Texas. July 21, 1912. (Hebard.) [Hebard Collection Type No. 165.]

Description of Type.—Size very large (for the genus); form robust. Head with the dorsum of the occiput plane, hardly ascending to the fastigium, the latter subcompressed, not as thick as the proximal antennal joint and when seen from the facial aspect with its margins gently converging ventrad, with the extremity at the interfastigial suture distinctly truncate; eyes moderately prominent, subcircular in basal outline; antennae very elongate, when in perfect condition at least three times as long as the body. Pronotum subsellate, when seen from the lateral aspect the metazona is distinctly and in a subbullate fashion ascending dorso-caudad, when seen from the dorsal aspect the metazona is seen to be somewhat inflated laterad, its greatest width about five-sixths the length of the entire pronotum; length of the metazona about two-fifths the length of the entire pronotum, transverse sulcus deeply and broadly impressed on the dorsum; cephalic margin of disk weakly arcuato-emarginate mesad, caudal margin of disk strongly and regularly arcuate, no indications of lateral shoulders present on prozona, but on the metazona these are well indicated and slightly projecting though well rounded; lateral lobes of the pronotum with the greatest dorsal length subequal to the greatest depth, cephalic margin oblique, straight, ventro-cephalic angle rounded obtuse, ventral margin moderately oblique, ventro-caudal angle sharper than a right angle with the angle proper strongly rounded, caudal margin oblique sinuate, humeral sinus but faintly indicated, convex callosity well indicated but elongate and narrow. Tegmina surpassing the apices of the caudal femora by about the length of the pronotum, moderately broad, apex moderately rounded; stridu-

lating field quite ample, rather bullate, in area surpassing that of the dorsum of the head and pronotum, stridulating vein straight, transverse, crassate, speculum broader than usual in the genus. Wings surpassing the tegmina by nearly the pronotal length. Cerci robust, rather short, median tooth directed proximo-mesal and subdepressed, shaft of cercus with a sinuate medio-longitudinal carination on the dorsal surface, the distal section subacuminate when seen from the dorsum, tapering regularly when seen from the side; subgenital plate moderately produced, distal margin obtuse-angulate emarginate, styles brief, articulate, a moderately distinct and complete medio-longitudinal and distinct lateral carinae indicated. Caudal femora about four-fifths the length of the body, moderately inflated proximad, ventral margins unspined, genicular lobes bispinose.

Allotype.—♀; Rosenberg, Fort Bend County, Texas. July 25 and 26, 1912. (Hebard.) [Hebard Collection.]

Description of Allotype.—The features here given are those of difference from the male sex. Size smaller than in the male sex; form more slender. Pronotum not at all sellate, when seen from the lateral aspect the dorsal outline is straight, greatest width of metazona about two-thirds the length of the whole pronotum; length of the metazona almost one-half the entire pronotal length, transverse sulcus well indicated on the dorsum but by no means so impressed as in the male; lateral shoulders not appreciably indicated anywhere. Tegmina slightly surpassing the apices of the caudal femora. Wings surpassing the tips of the tegmina by several millimeters. Ovipositor slightly more than half the length of the caudal femora, rather strongly falcate, comparatively broad, apex acute, ventral margin of ovipositor appreciably but very finely serrulate on distal half; subgenital plate of female shallowly and narrowly emarginate disto-mesad.

Paratype Series.—We have selected as paratypes two males from Galveston, Texas, bearing the same data as the type, one male from Rosenberg, Texas, bearing the same data as the allotype and six males from Gregory, San Patricio County, Texas, July 30, 1912 (Hebard).

Measurements (in millimeters)

	♂ Galveston (Type)	♂ Galveston (Paratype)	♂ Rosenberg (Paratype)	♂ Gregory (Paratype)
Length of body.....	22	23.5	20	22.8
Length of pronotum.....	5.5	5.8	5.3	5.3
Greatest caudal width of pronotum.....	4.5	4.5	4.1	4.3
Length of tegmen.....	29	27	23.5	28.6
Greatest width of stridulating field of tegmen.....	4.7	4.9	4.5	4.6
Length of caudal femur.....	18.9	20	16.8	19
Length of ovipositor.....	.....	.....	.....	.....

	♂ Mission	♂ Brownsville	♀ Rosenberg (<i>Allotype</i>)
Length of body	17.5	20.2	19.5
Length of pronotum	4.9	4.9	4.8
Greatest caudal width of pronotum	3.9	4	3.6
Length of tegmen	24.2	23.5	21.7
Greatest width of stridulating field of tegmen	4.2	4.2	....
Length of caudal femur	15	16.8	17.3
Length of ovipositor . . . . .	....	....	8.3

Color Notes.—General color ranging from light chalcedony yellow to clear dull green-yellow (Ridgway), occasionally embrowned by desiccation until it is nearly old gold, the greater portion of the tegmina more brilliant, varying from light oriental green to nearly dull citrine; dorsum of the head, pronotum and stridulating field of the male tegmina washed with cinnamon-buff to clay color. Occiput generally with indications of a pair of hessian brown lines diverging caudad; eyes ranging from rood's brown to seal brown; antennae ochraceous-buff to ochraceous-tawny, rather weakly annulate with darker. Pronotum with the dorsum bearing abbreviate diverging lines similar to but less frequently indicated than those on the occiput. Tegmina with three spots of seal brown always indicated in the male sex, one proximad, another at the apex of the arcuate portion of the anal vein at its junction with the speculum and the third near the other (toward the free margin) angle of the speculum. Limbs quite greenish, rarely quite brownish (sudan brown) on the caudal tibiae, a blackish mark between the slits of the tympana of the cephalic tibiae; all spines black, at least at the tips, on the caudal tibiae largely brownish black. Apex of the abdomen more or less yellow-ocher, the cerci ochraceous-orange to mars yellow. Ovipositor prout's brown.

Distribution.—This species is found from the coastal prairie region of Texas, south as far as the Brownsville region, north to northern Texas (Wichita Falls and Dallas). west as far as Comanche and Mission (Hidalgo County) in the same state, while to the eastward the species ranges as far as eastern Louisiana (Milneburg). It doubtless occurs in northeastern Mexico.

Biological Notes.—This species was found frequenting high grasses along streams or in depressions (Rosenberg), in areas of

marsh vegetation (Gregory) or in dense clumps of coffee bean (*Sesban macrocarpa*) growing from six to ten feet high on sandy soil back from the gulf beach (Galveston). Its note was a long buzzing zzzzzzz, somewhat resembling that of some cicadas, with but few interspersed clicking sounds. At Gregory the song was noticed to be especially loud during the morning, again increasing in volume at night, but in a more subdued tone and different key.

Morphological Notes.—The ventro-external margin of the caudal femora is usually unarmed, but in two specimens we find a single spine on one or the other margin, another has two spines on one margin and a third specimen has a single spine on one limb and three on the other.

The two Galveston paratypes and the Rosenberg pair have the tegmina and wings shorter than the remainder of the material, which have proportions about as in the type.

- Specimens Examined:* 25; 18 ♂, 7 ♀.
 Milneburg, Louisiana, VII, 22, 1905, (Morse), 2 ♀, [Morse Coll.].
 Dallas, Texas, (Boll), 1 ♀, [M. C. Z.].
 Wichita Falls, Texas, VIII, 15, 1905, (Morse), 1 ♂, [Morse Coll.].
 Comanche, Texas, VII, 22, 1909, (C. R. Jones; on cotton), 1 ♂, [U. S. N. M.].
 Galveston, Texas, VII, 21, 1912, (H.), 3 ♂, *type* and *paratypes*.
 Rosenberg, Texas, VII, 25 and 26, 1912, (H.), 1 ♂, 1 ♀, *allotype* and *paratype*.
 Victoria, Texas, VI, (Caudell), 1 ♂, 1 ♀; VII, 22, (W. E. Hinds), 1 ♀; VI, 19, 1908, (E. S. Tucker on corn), 1 ♂, [U. S. N. M.].
 Gregory, Texas, VII, 30, 1912, (H.), 6 ♂, *paratypes*.
 Mission, Texas, VIII, 5 and 6, 1912, (H.), 1 ♂.
 Brownsville, Texas, VII, 31 to VIII, 5, 1912, (H.), 2 ♂.
 Coast of Texas (Aaron), 1 ♂, 1 ♀, [M. C. Z.].

This is in part the *Orchelimum longipenne* recorded by Caudell from "south ern Texas," as material before us so labelled shows.

- Orchelimum laticauda** Redtenbacher¹⁶ (Figs. 10, 24, 47, 48 and 75)
 1891. *X[iphidium] (Orchelimum) laticauda* Redtenbacher, Verh. k. k. zool.-bot. Gesell. Wien, xli, pp. 195, 501. [New Orleans, Louisiana.]
 1909. *Orchelimum pulchellum* Davis, Canad. Entom., xli, p. 33. [Dennisville, Helmetta and Trenton, New Jersey.]

A careful study of Redtenbacher's description has resulted in our placing *pulchellum* as a synonym of *laticauda*. Mr. Davis

¹⁶The present authors or the senior author alone have erroneously regarded this species as *O. nigripes* (Entom. News, xlii, p. 315; Proc. Acad. Nat. Sci. Phila., 1901, p. 796 and Rep. N. J. State Mus., 1909, p. 189) and as *O. schlegelii*

has gone over the ground with us and agrees that the description fits large Florida specimens, which are specifically identical with his New Jersey material. Through the kindness of the same gentleman we have before us eight of his typical New Jersey specimens of *pulchellum* for comparison.

Redtenbacher has given as one of the main characters of this species the presence of spines on the ventro-internal margin of the caudal femora. This we find occurs in but few specimens, the vast majority having the internal margin unarmed. The number of spines on the ventro-external margin varies from two to eight.

Davis was correct in giving *nigripes* as the closest relative of this species, the present authors' comment on this point¹⁷ being due to a misconception of *nigripes*.

The average size of specimens from the northern portion of the range of the species is distinctly under that of individuals from the southern states, but this is by no means an absolute rule, as series show very considerable individual variation, which almost or quite equals the geographic averages. Female specimens from Tinicum, Pennsylvania, and Florence, South Carolina, show the following extremes in size (measurements in millimeters).

	Tinicum, Pennsylvania		Florence, South Carolina	
Length of body (exclusive of ovipositor)	18.3	22.8	20	20
Length of pronotum	4.2	5.3	5	5.7
Length of tegmen	18.7	28.3	21.9	26.3
Length of caudal femur	15.3	19.2	18.3	19.2
Length of ovipositor	9	10.7	10.3	11.2

The intensity of the coloration and the brilliancy of certain shades varies considerably in the series before us.

Distribution.—Covering the Atlantic Coastal Plain region from north central New Jersey (Helmetta, Spotswood and Jamesburg) south to southern Florida, westward to New Orleans, Louisiana; in the eastern states occurring at suitable valley (Proc. Acad. Nat. Sci. Phila., 1904, p. 796 (Part); Ibid., 1905, p. 48 and Ibid., 1907, p. 306). The first misidentification was due to the fact that true *nigripes* was not at hand for examination, and the second was due first to the confusion of two species and later, when this was found to be the case, error was made in restricting *nitidum* to the wrong component. The present species has also been erroneously recorded as *nigripes* by Smith, Brimley and Allard.

¹⁷ Proc. Acad. Nat. Sci. Phila., 1910, p. 612, (1911).

localities in the Piedmont region above the fall-line (Chestnut Hill, Pennsylvania, Montgomery County, Maryland, and Thompson's Mills, Georgia).

Specimens Examined: 219, 120 ♂, 97 ♀, 1 juv. ♂, 1 juv. ♀.

Chestnut Hill, Philadelphia, Pennsylvania, IX, 18, 1903, (H.; in cattails), 2 ♂, 3 ♀.

Cornwells, Pennsylvania, X, 1906, (R. & H.; in cattails), 2 ♂, 1 ♀, IX, 7, 1914, (H.; in great numbers in tall plants along river and in marsh vegetation), 18 ♂, 26 ♀.

Timicum, Pennsylvania, VIII, 13, 1911, IX, 9 to 29, 1903 to 1913, (R. & H.; in numbers in cattails and high reeds), 46 ♂, 28 ♀, 1 juv. ♂.

Riverton, New Jersey, IX, 11, 1904, (G. M. Greene), 1 ♂, 1 ♀, [A. N. S. P.].

Spotswood, New Jersey, IX, 22, 1909, (W. T. Davis), 1 ♂, [Davis Cln.].

Helmetta, New Jersey, IX, 21, 1909, (W. T. Davis), 4 ♂, [Davis Cln.].

*Paratypes of *Orchelimum pulchellum* Davis.*

Jamesburg, New Jersey, IX, 23, 1909, (W. T. Davis), 1 ♂, [Davis Cln.]; 1 ♂, 1 ♀, [U. S. N. M.].

Maple Shade, New Jersey, X, 10, 1914, (B. Long), 1 ♂, 2 ♀, [A. N. S. P.].

Dennisville, New Jersey, IX, 5, 1909 (W. T. Davis), 1 ♂, [U. S. N. M.].

*Paratype of *Orchelimum pulchellum* Davis.*

Near Town Bank, Cape May County, New Jersey, VIII, 15, 1912, 1 ♂, [Davis Cln.].

Anglesea, New Jersey, IX, 6, 1 ♂, 1 ♀, [Hebard Cln.].

Tolchester, Maryland, VIII, 30, 1 ♂, [U. S. N. M.].

Plummer's Island, Maryland, IX, 2, (A. N. Caudell), 1 ♂, [U. S. N. M.].

Montgomery County, Maryland, IX, 25, 1911, (W. T. Davis), 1 ♂, [Davis Cln.].

Hyattsville, Maryland, IX, 17, 1911, (W. T. Davis), 1 ♂, [Davis Cln.].

Washington, D. C., VIII, 1883, 1 ♂, 2 ♀, [Hebard Cln.]; VIII, 23, 1878, IX, 27, 1896, X, 21, 1902, 1 ♂, 2 ♀, [U. S. N. M.].

Anolostan Island, Virginia, IX, 6, 1912, (A. N. Caudell), 3 ♀, [U. S. N. M.].

Rossllyn, Virginia, IX, (A. N. Caudell), 1 ♂, 3 ♀, [U. S. N. M.].

Fredericksburg, Virginia, VII, 20, 1913, (R. & H.; in tall weeds along river), 1 ♂.

Weldon, North Carolina, VII, 24, 1913, (R. & H.), 1 juv. ♂.

Newbern, North Carolina (Ardway), 2 ♀, [M. C. Z.].

Lake Waccamaw, North Carolina, IX, 8, 1911, (R. & H.; among low swamp plants in timbered swamp), 2 ♂, 5 ♀.

Florence, South Carolina, IX, 6, 1911, (R. & H.; in swamp grasses along branch in open spot in deciduous woods), 4 ♂, 8 ♀.

Thompson's Mills, Georgia, X, 1909, (H. A. Allard), 2 ♂, 1 ♀, [U. S. N. M.].

Jesup, Georgia, IX, 1, 1911, (H.; among bullrushes in pond in pine forest), 1 ♂.

Billy's Island, Georgia, VI and VII, 1912, (J. C. Bradley), 2 ♂, 1 ♀.

Atlantic Beach, Florida, VIII 24, 1911, (R. & H.; in hammock land and saw-grass and reed marsh), 1 ♂, 5 ♀.

- Jacksonville, Florida, (Pridley), 2 ♂, 1 ♀, [Hebard Cln.]
 South Jacksonville, Florida, IX, 7 and 28, 1913, (W. T. Davis), 3 ♂, [Davis Cln.]
 Ortega, Florida, IX, 6 and 27, 1913, (W. T. Davis), 3 ♂, [Davis Cln.]
 Sanford, Florida, (G. B. Frazer), 2 ♂, [M. C. Z.]

In addition to these localities we have already recorded the species as *nigripes*, *nitidum* and as the synonymous *pulchellum* from Belleplain, Riverton, Lucaston, Gloucester, Clementon, West Creek and Sea Isle City, New Jersey; Edenton and Raleigh, North Carolina; Thomasville, Georgia, and Jacksonville, Palatka, Detroit, Lakeland and Chokoloskee, Florida.

Orchelimum nigripes Scudder (Figs. 11, 25, 49, 50 and 76.)

- ?1869. *Xiphidium validum* Walker, Catal. Derm. Salt. Brit. Mus., ii, p. 277.
 [No locality.]
 1875. *Orchelimum nigripes* Scudder, Proc. Boston. Soc. Nat. Hist., xvii, p. 459. [Dallas, Texas.]
 1891. *Xiphidium* (*Orchelimum*) *robustum* Redtenbacher, Verh. k.-k. zool.-bot. Gesell. Wien, xli, pp. 494, 499. [New Orleans, Louisiana.]

We have examined the type of the present species in the collection of the Museum of Comparative Zoology. It is a male from Dallas, Texas, bearing labels reading, "Scudder's Type 1875, *Orchelimum nigripes* Scudd.," also, "Boll's no. 21." The measurements of the type are as follows: length of body, 17 mm.; length of pronotum, 5; greatest caudal width of pronotum, 3.5; length of tegmen, 21; length of caudal femur, 16.6.

Through the kindness of Mr. A. N. Caudell we have before us notes which he made from the type of Walker's *validum*. Taken with the characters given in the original description of the same the combination appears to fit the present form better than any other in the genus, this being the position assigned *validum* by Kirby. However, there is nothing really conclusive in the agreement of these features and Mr. Caudell's comment is, that, while he had time to make but a hurried examination of the specimen, he is "very sure it is not the same as our *nigripes*." Taken altogether it seems best to give the name *validum* a queried position under this species, leaving for the future the exact determination of its status.

The above synonymy is evident after carefully studying the literature. Redtenbacher's *robustum* is certainly *nigripes* with the exception of the caudal limbs, these in all probability not belonging to the specimen. Their size, *i. e.*, length of the femora, is distinctly less than that normal for specimens of the genus of

similar body bulk to the single female of *robustum*, while their spineless character shows they in all probability belong to a smaller individual of a different species of the genus. The color of the cephalic and median tibiae and all of the other color features of *robustum* are those of *nigripes*, while the peculiar features of the lateral lobes of the pronotum of this species are well described.

This species is closely related to *O. laticauda*, which it replaces throughout the central valley and prairie region of the United States. The eastern species, *laticauda*, has on numerous occasions been mistaken for *nigripes* and so recorded, but there need be no confusion of the two forms after they have once been compared. The shape of the lateral lobes of the pronotum alone serves as a ready means for separating the species. We have seen two specimens of this species from Lafayette, Indiana, which show practically no black on the tibiae.

In size this species shows much the same features as *laticauda*, averaging smaller in the northern portion of its range and larger in the southern, but individual variation is everywhere evident. The caudate winged type is typically represented by two females, one from Lincoln, Nebraska, and the other from Victoria, Texas. In addition a number of both sexes have the tegmina and wings more elongate than in the majority of the series. Two specimens in the present series have the caudal femora spined on the ventro-internal margin.

Distribution.—The central valleys and prairies of the United States, from as far north as the shores of the Mississippi in Minnesota (Lugger), south to New Orleans (Redtenbacher) and Victoria, Texas, east to Point Pelee, southern Ontario (E. M. Walker), Columbus, Ohio, and Clarksville, Tennessee, west as far as Gering, on the Platte River, in western Nebraska and Denver and "Rocky Mountains" (Redtenbacher), Colorado.

Specimens Examined: 68; 23 ♂, 43 ♀, 2 juv. ♀.

Columbus, Ohio (C. M. Mead), 1 ♀, [Hebard Cln.].

Indiana, (W. S. Blatchley), 3 ♂, 4 ♀, [Hebard Cln. and Morse Cln.].

Lafayette, Indiana, X, 14, 1913, (H. Fox), 18, 1 ♀, [A. N. S. P.].

Vigo County, Indiana, (W. S. Blatchley), 1 ♂, 1 ♀, [Morse Cln. and U. S. N. M.].

Goose Pond, Indiana, IX, 6, 1892, (Blatchley), 1 ♀, [U. S. N. M.].

Illinois, 1 ♂, [M. C. Z.].

- Clarksville, Tennessee, X, 1, 1913. (S. E. Crumb; feeding on tobacco), 1 ♂, 2 ♀, [U. S. N. M.].
- Lone Rock, Wisconsin, VIII, 23, 1906, 1 ♀, [Penna. State Dept. Zool.].
- Ames, Iowa, VIII, 28, 1897, 1 ♀, [M. C. Z.].
- Iowa City, Iowa, (Shimek), 1 ♂, 10 ♀, [Hebard Cln.].
- Omaha, Nebraska, 1 ♂, [Hebard Cln.].
- Lincoln, Nebraska, IX, 3, 1909, IX, 15, IX, 1888, 2 ♂, 7 ♀, [Hebard Cln.]; IX, (Bruner), 1 ♀, [Cornell Univ.].
- Weeping Water, Nebraska, IX, 24, 1909, (Bruner), 1 ♀, [Hebard Cln.].
- Gering, Nebraska, 1 ♀, [Hebard Cln.].
- Shawnee County, Kansas, 1882, 1 ♂, 1 ♀, [Hebard Cln.].
- Topeka, Kansas, (Cragin), 1 ♂, [Hebard Cln.].
- Wichita, Kansas, X, 3, 1909, (F. B. Isely), 1 ♂, 1 ♀, [U. S. N. M.].
- Fayetteville, Arkansas, IX, 5, 1905, (Morse), 1 ♂, 2 ♀, [Morse Cln.].
- De Queen, Arkansas, VII, 29, 1905, (Morse), 1 ♂, [Morse Cln.].
- Arkadelphia, Arkansas, IX, 13, 1914, (C. B. Jones), 1 ♀, [U. S. N. M.].
- Denver, Colorado, 2 ♀, [M. C. Z.].
- Denison, Texas, VIII, 11, 1905, (Morse), 1 ♂, [Morse Cln.].
- Dallas, Texas, (Boll), 1 ♂, [M. C. Z.], *type*: IX, 10, 1909, (E. S. Tucker; on *Polygonum* blossoms), 1 ♂, [U. S. N. M.].
- Wichita Falls, Texas, VIII, 16, 1905, (Morse), 1 ♂, [Morse Cln.].
- Beaumont, Texas, VII, 23, 1912, (H.; swampy land), 3 ♂, 2 ♀, 2 juv. ♀.
- Victoria, Texas, VII, 26 to 27, 1912, (H.; high weeds in "Branch"), 2 ♂, 1 ♀.

Orchelimum minor Bruner (Figs. 3, 26, 51, 52 and 77.)

1891. *Orchelimum minor* Bruner, Canad. Entom., xxiii, p. 72. [District of Columbia.]
1905. *Orchelimum cuticulare?* Rehn and Hebard, Proc. Acad. Nat. Sci. Phila., 1904, p. 796. [Thomasville, Georgia.]

An examination of the present series of specimens of both sexes of this rare species shows that the number of spines on the ventro-external margin of the caudal femora varies from two to seven, one individual possessing two on one limb and six on the other.

In general size there is some variation which may be geographic, as the largest individual is from the most southern point from which the species has been recorded, although the series in hand is not sufficient to more than call attention to this feature.

The male cerci show some variation in the length of the distal portion of the shaft, this being most apparent in the large Thomasville specimen. This, like the size extreme of the same individual, may possibly be explained on geographic grounds.

The speculum of the stridulating field of the male tegmina varies to an appreciable degree in the exact ratio of length and

breadth, in fact more so than in any other form except *O. concinnum*, but an exact expression of this variation is hardly possible, as, while tangible and apparent to the eye after study of the genus, it is relatively so slight that a satisfactory and convincing measurement of it is hard to secure.

The type of the species, a female, is now before us and measurements of it have never been published. We here give these and the proportions of several representative males as well as the large Thomasville individual of the same sex.

Measurements (in millimeters)

	Length of body	Length of pronotum	Length of tegmen	Length of caudal femur	Length of ovipositor
♂					
Atsion, New Jersey.....	16	4.4	15	13.2	
Sulphur Springs, North Carolina.....	15.9	4.2	16	13.2	
Thomasville, Georgia....	20.8	4.8	15.6	15.6	
♀					
District of Columbia					
<i>Type</i>	15.4	4.2	16.2	14.5	14

Synonymy.—In the prefatory remarks (p. 18) we have already commented upon our queried determination of this species as *O. cuticulare*. The specimen so named had lost all of its original coloration, was of larger size than the average of the species and had the cerci rather longer than usual. The true *cuticulare* of Serville, as we have shown elsewhere in this paper, equals the earlier *glaberrimum* and the form called *cuticulare* by Redtenbacher is the very different *calcaratum*.

Distribution.—The Coastal Plain of the eastern United States from central New Jersey (Helmetta and Lakehurst), south to southern Georgia (Thomasville), west as far as the mountain valleys of North Carolina (Sulphur Springs) at an elevation of 2500 feet and the vicinity of Washington. To the localities from which the species has been recorded we may add Florence, South Carolina, where its note was heard coming from about twelve feet up in a short-leaf pine.

Specimens Examined: 47; 33 ♂, 8 ♀, 1 juv. ♂, 5 juv. ♀.

Almost all of the material before us has been previously recorded, but we are listing it here to show the sources of information for the present study.

Brown's Mills Junction, New Jersey, X, 6, 1907, [E. Daecker, 1 ♀, [Hebard Coll.].

Lakehurst, New Jersey, IX, 6, X, 19, (W. T. Davis), 1 ♂, 1 ♀, [Davis Coll.].

- Stafford's Forge, New Jersey, IX, 16, 1905, (H.), 1 ♂, [Hebard Chn].
 Atsion, New Jersey, X, 8, 1903, (H.), 2 ♂, [Hebard Chn. and A. N. S. P.].
 Reega, New Jersey, VIII, 10, 1914, (H., undergrowth in pine barrens), 1 juv. ♂, 4 juv. ♀; VIII, 29, 1914, (H.; common in pines, males continuing to sing after dark), 1 ♂, 1 ♀, 1 juv. ♀.
 Maryland opposite Plummer's Island, IX, 6, 1909, (H. A. Allard; on pine), 3 ♂, 1 ♀, [U. S. N. M.].
 District of Columbia, IX, 15, 1884, 1 ♀, *type*, [Hebard Chn.].
 Sulphur Springs, North Carolina, IX, 2 and X, 6, 1905, (H.), 3 ♂, [Hebard Chn. and A. N. S. P.].
 Raleigh, North Carolina, IX, 20, 1904, (Brimley), 1 ♀, [Hebard Chn.].
 Thompson's Mills, Georgia, 1908, X, 1909 and 1910, (H. A. Allard), 20 ♂, 2 ♀, [Hebard, Chn., A. N. S. P., and U. S. N. M.].
 Hosehton, Georgia, X, 5, 1908, (H. A. Allard), 1 ♂, [U. S. N. M.].
 Thomasville, Georgia, VIII, 28, 1903, 1 ♂, [Hebard Chn.].

Orchelimum concinnum Scudder (Figs. 12, 27, 53, 54, 78 and 79.)

1862. [*Orchelimum*] *concinnum* Scudder, Boston Journ. Nat. Hist., vii, p. 452. [Cape Cod, Massachusetts.]
 1862. [*Orchelimum*] *longipennis* Scudder, *Ibid.*, p. 453. [Texas.]
 1891. *Orchelimum gracile* Bruner (not *Orchelimum gracilis* Harris), *Canad. Entom.*, xxiii, p. 70. [West Point and Lincoln, and Wheeler, Garfield and Holt Counties, Nebraska.]
 1891. *Xiphidium* (*Orchelimum*) *incrim* Redtenbacher, *Verh. k.-k. zool.-bot. Gesell. Wien*, xli, pp. 495, 501 [Texas; Kansas].
 1892. *Orchelimum delicatum* Bruner, *Entom. News*, iii, p. 265. [New name for *O. gracile* Bruner, not of Harris.]
 1893. *Orchelimum indianense* Blatchley, *Canad. Entom.*, xxv, p. 90. [Kewanna, Fulton County, Indiana.]
 1893. *Orchelimum campestris* Blatchley, *Ibid.*, p. 91. [Vigo and Fulton Counties, Indiana.]
 1899. *Xiphidium gracilinum* Griffini, *Miscell. Entom.*, vii, p. 96. [New name for *Orchelimum gracile* Bruner, not of Harris.]

The present species is probably the most variable, as it is the most widely distributed, form in the genus and the above synonymy illustrates the difficulty previous authors have encountered in endeavoring to determine material belonging to it. The present authors have given more time and consideration to it than to any other member of the genus, and after the most critical examination of the specimens in hand and a careful testing of the evidence on which the numerous synonyms were erected, we are thoroughly convinced that *concinnum* is a very variable form, showing decided geographic size variation, probable environmental adaptations in ovipositor characters in the female and

certainly great individual variation in certain structural and several color features.

We have examined eleven specimens of the original Cape Cod series on which Scudder based *concinnum*. Ten of these are now in the Museum of Comparative Zoology and one, a male, is in the United States National Museum. Of the former lot we select as lectotype a male labelled: "*O. concinnum*, Cape Cod," with an additional round red paper label. The single type of *O. longipennis*, a female, is in the Museum of Comparative Zoology labelled: "Texas. A. Agassiz. *O. longipennis* Scudd.," with an additional red type label.

The type and paratypes of *Orchelimum gracile* Bruner (*Orchelimum delicatum* Bruner) are now before us and the only tangible character to separate them from pale faced eastern specimens of *concinnum* is the longer, straighter ovipositor, which is discussed beyond. Redtenbacher's *inerme* was proposed merely to replace *longipennis*, which name was preoccupied in the genus *Xiphidium* in which he placed it. The description of *inerme*, when examined, is also seen to be based on the same condition of this species as that to which Scudder gave the name *longipennis*. Blatchley's *indianense* is absolutely inseparable from dark faced *concinnum*, while *campestre* is the pale faced condition of this species, paratypes of both forms, now before us, demonstrating this very clearly.

Taking up the features of variation in this species, we find they can readily be classified under three headings, *i. e.*, geographic and individual size variation, ovipositor variation and general color and structure variation.

Individual size variation at any one locality is less pronounced in this species than in most of the other forms of the genus, but the geographic size variation is very great. Material from New England is minimum in size, southward along the east coast the bulk increasing until individuals from the southeastern states are very decidedly larger than those from New Hampshire. Specimens from Indiana and Iowa are larger than New England individuals but not greatly so, while in eastern Nebraska and eastern Kansas the size is in general as great as in representatives from the coast of Georgia; southward in Texas and northern New Mexico the bulk regularly increases, until on the central Gulf coast of

Texas we find maximum sized individuals nearly twice as large as New England specimens and at first glance apparently very different. From west central Nebraska northward to south central Montana we find the species holds a fairly uniform size.

The most puzzling variation feature is in the length and curve of the ovipositor. Over almost the entire range of the species there is little variation in the relative size and curve of the ovipositor, which shows only very minor variations in depth, etc. In the central area, however, and to a lesser degree in Montana, we find a part or all of the females from certain localities possessing ovipositors far longer, more robust and straighter than the average type. This is the form called *delicatum* (*gracile*) by Bruner and it and the more normal *concinnum* type were both taken by him at West Point and Lincoln, Nebraska, while numerous female specimens from Neligh, Kearney, North Platte and Haigler, Nebraska, and Billings, Montana, are nearer this type than average *concinnum*, or intermediate between the two. No other structural character stands the tests for correlation with this ovipositor feature and it is impossible to sort the males before us into two species, those, fourteen in number, for instance, from Billings, a locality having no typical *concinnum* ovipositor among its sixteen females, being quite inseparable from more eastern specimens, while the males from West Point and Lincoln are certainly one species, the male type of *delicatum* being the same as dozens of others which are undoubted *concinnum*. The explanation of this ovipositor development should, we think, be looked for in the immediate environment in which the long ovipositor individuals occur, the fact that both have been taken at one locality strongly suggesting this.

Among the general structural variations we find the width of the fastigium and the degree of divergence of the margins of the same, when seen from the cephalic aspect, to be quite variable, while the degree of straightness or arcuation of the ventro-caudal margin of the lateral lobes of the pronotum and the degree of angulation of the caudal margin of the same are inconstant, varying in nearly every series from a single locality. The form of the stridulating field of the male tegmina is rather plastic, while the male cerci show certain variational features in length, degree of slenderness of the distal extremity and the strength of the

dorsal carination. In the present species the majority of the specimens are decidedly long-winged, *i. e.*, having the tegmina and wings strongly surpassing the apices of the caudal femora, while in a number of specimens, these outnumbering the more usual type in the eastern Nebraska representation, the tegmina and wings are extremely elongate, surpassing the caudal femora by from one-half to two-thirds their length. The long-winged type is that to which Scudder gave his name *longipennis*. The tegmina and wings average shorter in the specimens from Kearney, Neligh, North Platte and Haigler, Nebraska, and Billings, Montana, than in those from any other locality. Every one of seven specimens collected at electric lights at Lincoln, Nebraska, by Prof. Bruner is of the very long-winged type, while of thirty specimens from Billings, all taken in a sedgy area, but two are of the very long-winged form.

The color variation is chiefly in that of the dorsum of the pronotum and of the face. The former area may be uniform with the general body color or may be supplied with a pair of brownish diverging lines, the area between these may or may not be infuscate or washed with ferruginous, while the extent and depth of these lines and the embrownment of the enclosed area on the occiput is variable in the same proportion as on the pronotum. The face may be concolorous with the remainder of the head or supplied with a more or less distinct median vertical bar, which in the more intensely colored specimens is almost blackish and generally considerably expanding ventrad, although it may be nearly subequal in width. Interior specimens do not show this dark bar, as far as our material goes, except in the case of the Indiana material called *indianense* by Blatchley and of a single female labelled "Colorado," but from the coastal sections this form generally outnumbers the pale faced type which occurs in exactly the same situations. In the coastal area of Texas the pale faced type is proportionately more numerous than in the eastern coastal section. The occasional presence of a similar facial bar has also been noted by us in *O. militare*.

From observations made in New Jersey by the junior author during the summer of 1914, it is evident that the young of the present species found in the eastern coastal region exhibit two color forms, one with a striped face, the other with a uniformly

green face. The striped face form retains that condition through the ecdyses to the adult condition, the other reaches the adult condition without acquiring the barred face, but within a few days after becoming adult, as the chitin thoroughly hardens the stripe develops and becomes as prominent as in the other type. This was ascertained by keeping specimens under observation from the immature stages to that of thoroughly hardened adults. It is very probable that green face adult specimens from New Jersey were taken before they had fully acquired their permanent adult coloration.

Measurements (in millimeters) of a number of average pairs from representative localities are here presented.

	Rye Beach, New Hampshire		Chestnut Neck, New Jersey		Wrightsville, North Carolina		Tybee Island, Georgia	
	♂	♀	♂	♀	♂	♀	♂	♀
Length of pronotum . . .	3.7	4.2	4.1	4.1	4.1	4.1	4.4	4.8
Length of tegmen	19	16.7	21.1	20	21.5	21.2	22.4	23
Length of caudal femur	13.2	13.5	14.8	15	16.5	15.7	16.6	17.5
Length of ovipositor	7.5	7.8	8.2	8.1	8.2	8.1	8.1	8.1
	Homestead, Florida		Vigo Co., Indiana (Paratypes of <i>O. campestre</i>)		West Point, Nebraska (<i>O. delicatum</i>) (type)		West Point, Nebraska (para- type)	
	♂	♀	♂	♀	♂	♀	♂	♀
Length of pronotum . . .	4.1	4.5	4.2	4.2	3.9	3.8	4.2	4.7
Length of tegmen	21.4	22.5	22.8	20.8	18	18.2	22.7	23.2
Length of caudal femur	14.5	17	16	15.6	14	14.5	16.5	18.5
Length of ovipositor	8.1	7.5	7.5	7.5	10.5	7.5	7.5	7.5
	Lincoln, Nebraska		North Platte, Nebraska		Billings, Montana		Texas (Type of <i>O.</i> <i>longipennis</i>)	
	♀	♂	♀	♂	♂	♀	♂	
Length of pronotum . . .	4.5	4.5	4.3	4.6	4.6	5	5	
Length of tegmen	26.2	19.8	20.2	22	21.3	29.6	29.6	
Length of caudal femur .	17.1	14.5	14.7	15.7	16.2	19	19	
Length of ovipositor . . .	13	9	9	9	9	8.5	8.5	
	Virginia Point, Texas		Gregory, Texas		Del Rio, Texas		Beulah, New Mexico	
	♂	♀	♂	♀	♂	♀	♂	♀
Length of pronotum . . .	4.9	5	5.2	5.5	4.9	4.6	5	5
Length of tegmen	25	25.5	30.7	23.9	20	24.7	26.8	26.8
Length of caudal femur .	17.8	18.6	18.9	18.5	16	17	17.5	17.5
Length of ovipositor . . .	9	9	9	8.4	11.2	11.2	11.2	11.2

Normally this species has the ventro-external margin of the caudal femora unspined, an occasional specimen, however, having

a single adventitious spine on one limb and much more rarely two spines on but a single limb. We have examined no specimen with spines on both caudal femora. Curiously all individuals noticed to have any spines at all are from localities west of the Mississippi (Iowa, Missouri, Nebraska and Texas).

Distribution.—In the eastern United States apparently restricted to the general vicinity of the coast, generally in or near salt marsh, and distributed from New Hampshire (Rye Beach) south to southern Florida (Homestead); in the interior ranging from extreme southern Ontario (five localities reported by Walker), northern peninsula of Michigan (Menominee), south-eastern Minnesota (see Luggler) and south-central Montana (Billings) south to the Gulf Coast of Florida and Mississippi, to at least south-central Texas (Gregory and Del Rio), west to at least Billings, Montana, eastern Colorado (La Junta and Julesburg) and Albuquerque, New Mexico. The vertical range of the species is easily the greatest in the genus, extending from sea-level to approximately 8000 feet (Beulah, New Mexico). From the eastern states we know of no correct record of the occurrence of the species at a locality away from the general vicinity of the coast. Allard has reported *longipenne* from Thompson's Mills, Georgia, but the material, which we have seen collected by him and so labelled, is referable to *O. agile*.

Specimens Examined: 472; 235 ♂, 212 ♀, 13 juv. ♂, 12 juv. ♀.

Rye Beach, New Hampshire, IX, 1 and 2, 1913, (H.; in salt marsh grass), 3 ♂, 4 ♀.

Vicinity of Boston, Massachusetts, (Scudder), 2 ♂, [M. C. Z.].

Cape Cod, Massachusetts, (Scudder), 9 ♂, 2 ♀, *type* and *paratypes*, [M. C. Z.; U. S. N. M.].

Scituate, Massachusetts, VIII, 29, 1897, (F. H. Sprague), 2 ♀, [M. C. Z.].

Wesque Beach, Rhode Island, IX, 8 to 10, 1913, (H ; in salt marsh grass), 1 ♂.

Stony Creek, Connecticut, IX, 2, 1904, (H. L. Viereck), 1 ♀, [A. N. S. P.].

Saybrook, Connecticut, VII, 27, 1904, (H. L. Viereck), 1 ♂, [A. N. S. P.].

Lighthouse Point, New Haven, Connecticut, IX, 27, 1904, (B. H. Walden), 1 ♀, [Hebard Cl.].

Spray Beach, New Jersey, IX, 6, 1906, (Bayard Long), 2 ♂, [A. N. S. P.].

Mulliea River meadows near New Gretna, New Jersey, VIII, 24, 1911, (H.; in short grass far out on flats and in bordering rush swamp), 19 ♂, 20 ♀, 1 juv. ♂, 1 juv. ♀.

Chestnut Neck, New Jersey, VII, 16, 1911, (R. & H.; in salt marsh grass), 2 ♂, 6 ♀.

- Canton, New Jersey, IX, 7, 1910, (H. Fox); 1 ♂, [A. N. S. P.].
- Ventnor, New Jersey, VIII, 5 to VIII, 26, 1914, (H.; abundant in marshy depression in sand), 40 ♂, 28 ♀, 6 juv. ♂, 7 juv. ♀.
- Margate City, New Jersey, VIII, 24, VIII, 17, 1914, (H.; scarce in salt marsh chiefly of *Panicularia fluitans*), 2 ♂, 2 ♀.
- Pleasantville, New Jersey, VIII, 17, 1914, (H.; shore margin of salt meadow), 1 ♂.
- Ocean City, New Jersey, VIII, 14, 1914, (H.; middle of salt marsh), 1 ♂.
- Tuckahoe, New Jersey, VIII, 26, 1914, (H.; in freshwater marsh), 1 ♂.
- Cedar Springs, New Jersey, VIII, 14 and 26, 1914, (H.; in fresh marsh grasses and rushes), 13 ♂, 7 ♀.
- Between Woodbine and Belleplain, New Jersey, VIII, 21, 1912, (H. Fox; in wet bog of *Juncus canadensis*), 2 ♂, 3 ♀, [A. N. S. P.].
- Ocean View, New Jersey, VII, 30, 1908, VII, 16, 1911, IX, 8, 1911, (H. Fox), 7 ♂, 9 ♀, [A. N. S. P.]; VII, 27, 1914, (H.; in upland field and on edge of salt marsh), 1 ♂, 1 ♀, 1 juv. ♀.
- Sea Isle City, New Jersey, X, 9, 1910, (H. Fox), 1 ♂, [A. N. S. P.].
- Piermont, New Jersey, VIII, 26, 1909, (H. Fox; salt marsh), 2 ♂, 1 ♀, [A. N. S. P.].
- Avalon, New Jersey, VIII, 12, 1911, (H. Fox), 3 ♂, 4 ♀, [A. N. S. P.].
- Swainton, New Jersey, VIII, 8, 1914, (H.; in swampy field), 1 ♀.
- Cape May Court House, New Jersey, VII, 20, VIII, 14 and 21, 1914, (H.; common in salt marsh of *Spartina patens* and *Distichlis spicata*), 2 ♂, 5 ♀, 6 juv. ♂, 2 juv. ♀, (immature individuals on the earliest date).
- Anglesea, New Jersey, IX, 5, 3 ♂, 5 ♀, [A. N. S. P.].
- Cold Spring, New Jersey, IX, 4, 1907, (Bayard Long), 2 ♀, [A. N. S. P.]; VIII, 28, 1912, (H. Fox), 2 ♀, [A. N. S. P.].
- Cape May, New Jersey, VII, 22, 1910, (H.; in salt marsh), 1 ♂.
- Chestertown, Maryland, VIII, 4, 1912, VIII, 24, 1900, (E. G. Vanatta), 1 ♂, 2 ♀, [A. N. S. P.].
- Virginia, VIII, 14, 1 ♀, [Hebard Cln.].
- Ocean View, Virginia, VIII, 9, 1904, (A. N. Caudell), 1 ♂, 2 ♀, [U. S. N. M.].
- Virginia Beach, Virginia, VIII, 31, 1903, (E. S. G. Titus), 1 ♂, 1 ♀, [U. S. N. M.].
- Wrightsville, North Carolina, IX, 7, 1911, (R. & H.; fairly abundant in high grasses growing on edge of dry land), 6 ♂, 6 ♀.
- Smith Island, North Carolina, X, 1906, (F. Sherman), 1 ♀, [U. S. N. M.].
- Tybee Island, Georgia, IX, 2, 1911, (R. & H.; very common in salt marsh), 24 ♂, 14 ♀; VIII, 12, 1903, (Morse), 5 ♂, 3 ♀, [Morse Cln.].
- Warrington, Florida, VIII, 4, 1903, (Morse), 2 ♂, 1 ♀, [Morse Cln.].
- Fort Barrancas, Florida, VIII, 3, 1903, (Morse), 4 ♂, 3 ♀, [Morse Cln.].
- Biloxi, Mississippi, VII, 19, 1905, (Morse), 1 ♂, 1 ♀, [Morse Cln.].
- Buras, Louisiana, VII, 23, 1905, (Morse), 1 ♀, [Morse Cln.].
- Crowley, Louisiana, IX, 23, 1911, (E. S. Tucker; in rice field), 2 ♂, 2 ♀, [U. S. N. M.].
- Cleveland, Ohio, VIII, 19, 1 ♂, [M. C. Z.].
- Cedar Point, Ohio, VIII, 1912, (W. J. Kostir), 1 ♀, [U. S. N. M.].

- Gypsum, Ohio, VIII, 20, (J. L. King), 1 ♂, [U. S. N. M].
- Menominee, Michigan, IX, 5, 1904, (E. S. G. Titus), 1 ♂, [U. S. N. M].
- Vigo County, Indiana, VIII, 27 and IX, 8, 1893. (Blatchley), 2 ♂, 2 ♀, [Hebard Cln., and U. S. N. M.]. *Paratypes of O. campestris.*
- Kewanee, Indiana, IX, 24, 1892, X, 7, 1893. (Blatchley) 3 ♂, 1 ♀, [Hebard Cln., M. C. Z. and U. S. N. M.]. *Paratypes of O. indianense.*
- Starke County, Indiana, VIII, 11, 1904, VIII, 15, 20 and 21, 1902. (Blatchley), 2 ♂, 4 ♀, [Hebard Cln., A. N. S. P., and U. S. N. M.].
- Marshall County, Indiana, VII, 29, 1902, X, 5 and 15, 1904. (Blatchley), 2 ♂, 4 ♀, [Hebard Cln., A. N. S. P., and U. S. N. M.].
- Lake Maxinkuckee, Indiana, VIII, 17, 1893. (Blatchley), 1 ♂, [Morse Cln.].
- Steuben County, Indiana, VIII, 6 and 8, 1902, IX, 8, 1902. (Blatchley) 5 ♂, 1 ♀, [Hebard Cln., A. N. S. P., and U. S. N. M.].
- Kosciusko County, Indiana, VIII, 8 and 27, 1902. (Blatchley), 1 ♂, 1 ♀, [A. N. S. P. and U. S. N. M.].
- Fulton County, Indiana, IX, 24, 1892. (Blatchley), 1 ♂, 1 ♀, [U. S. N. M.].
- Lake County, Indiana, IX, 1, 1902. (Blatchley), 2 ♀, [A. N. S. P., and U. S. N. M.].
- Moline, Illinois, VIII, 4, (McNeill), 1 ♀, [M. C. Z.].
- Lawn Ridge, Illinois. (A. Agassiz), 1 ♀, [M. C. Z.].
- Arkansas, 1 ♀, [U. S. N. M.].
- Fort Dodge, Iowa, VIII, 27, 1910, (M. P. Somes), 1 ♀, [Hebard Cln.].
- Dallas County, Iowa, VIII, 20 to 23, (Allen), 1 ♀, [M. C. Z.].
- Hollister, Missouri, VIII, 12, 1912, (H. H. Knight), 2 ♂, 1 ♀, [Cornell Univ.].
- West Point, Nebraska, VII, 1884, VIII, 17, IX, 4 and 5, (L. Bruner), 8 ♂, 7 ♀ [Hebard Cln.]; VIII, 17, (L. Bruner), 1 ♂, 1 ♀, [Cornell Univ.]. *Type and five paratypes of gracile Bruner.*
- Lincoln, Nebraska, VII, VIII, (L. Bruner), 7 ♂, 6 ♀, [Hebard Cln., and U. S. N. M.].
- Burnham, Nebraska, VIII, 30, 1911, (L. Bruner), 1 ♂, [Hebard Cln.].
- Cedar Bluffs, Nebraska, 2 ♀, [Hebard Cln.].
- Neligh, Nebraska, VIII, (M. Cary), 2 ♀, [Hebard Cln.].
- Kearney, Nebraska, VII, 27, 1910, (R. & H.; in grassy patch), 1 ♀.
- North Platte, Nebraska, VII, 28, 1910, (R. & H.; in marshy tract), 6 ♂, 8 ♀.
- Haigler, Nebraska, VIII, 10, 1901, (L. Bruner), 1 ♀, [Hebard Cln.].
- Clearwater, Kansas, VIII, 30, 1904, (F. B. Isely), 1 ♂, [U. S. N. M.].
- Billings, Montana, VII, 28, 1909, (R. & H.; in marshy area of sedges), 14 ♂, 16 ♀, 1 juv. ♀.
- Julesburg, Colorado, VII, 29, 1910, (R. & H.; in grasses in river bottom), 1 ♂, 1 ♀.
- Near La Junta, Colorado, IX, 11, 1909, (R. & H.; in Arkansas River bottom land), 1 ♂.
- Barber County, Kansas, (F. W. Cragin), 2 ♂, [Hebard Cln.].
- Dallas, Texas, (Boll), 1 ♀, [M. C. Z.].
- Virginia Point, Texas, VII, 21, 1912, (H.; in luxuriant salt marsh vegetation), 5 ♂, 7 ♀.
- Victoria, Texas, VI, (A. N. Caudell), 1 ♀, [U. S. N. M.].

Gregory, Texas, VII, 30, 1912, (H.; in fresh marsh vegetation), 1 ♂.

Del Rio, Texas, VIII, 22 and 23, 1912, (R. & H.; in heavy grasses in Rio Grande bottom), 2 ♂, 1 ♀.

Albuquerque, New Mexico, VII, 13 and 16, (Oslar), 2 ♂, 1 ♀, [A. N. S. P.]; IX, 14, 1907, (H.; in cultivated ground), 1 ♂, [Hebard Cln.].

Beulah, New Mexico, VIII, 17, (H. Skinner), 1 ♂, 2 ♀. [A. N. S. P.].

The present authors or the senior author alone have already recorded this species from Atlantic City, New Jersey and Punta Gorda, Fort Myers, South Bay of Lake Okeechobee, Chokoloskee and Homestead, Florida, and as *longipenne* from Hannibal, Missouri.

Orchelimum fidicinium Rehn and Hebard (Figs. 13, 28, 55, 56 and 80.)
?1839. *Orchelimum herbaceum* Serville, Hist. Nat. Ins. Orth., p. 524. [North America.]

1907. *Orchelimum fidicinium* Rehn and Hebard, Proc. Acad. Nat. Sci. Phila., 1907, p. 309, figs. 7 to 9. [Cedar Keys and Gainesville, Florida.]

1908. *Orchelimum crusculum* Davis, Journ. N. Y. Entom. Soc., xvi, p. 223. [Tuckerton, New Jersey; Staten Island and Rockaway, New York.]

As we have already stated in the preliminary remarks on the genus, Serville's *herbaceum*, which has generally been associated with Scudder's *concinnum*, seems to resemble this species more closely in the length and form of the ovipositor than any other of which we know the female, except the long ovipositor type of *concinnum*. The latter condition, however, as far as known, occurs only in a region which at that time was almost unexplored and there is little possibility of it having been in Serville's possession, particularly as he says the specimen came from Latreille, who died in 1833. The character of the facial marking described by Serville is not normally found in any form known to us, that is no form has an "almost transverse" black spot on the face. A similar condition is found below the eyes in specimens of a number of species which have discolored in drying. However, we have no definite proof that *herbaceum* is the same as *fidicinium*, and, until we have some positive information of this sort, we do not care to replace a well understood name by another of doubtful status. We have endeavored to locate Serville's type and have the same examined, but unfortunately without success.

The synonymy of *crusculum* is evident on comparison of typical material of the same, kindly loaned to us by Mr. Davis, with the typical series of *fidicinium*.

As in other species of the genus there is a general increase in size southward, but in the Cumberland Island series we find a

very considerable amount of individual variation in this respect in both sexes. The smaller New Jersey individuals, however, are very appreciably smaller than the smallest Cumberland Island specimens.

The ovipositor curve varies somewhat, in one extreme this appendage being straighter than in others, with its dorsal margin but little arcuate, while the more usual condition has the whole ovipositor with its margins more regularly but not strongly arcuate. The distal section of the ventro-external margin of the caudal femora is either unarmed or supplied with from one to five spines. An examination of thirty specimens, taken at random, for the number of these spines shows the following:

Cape May, New Jersey	Wrightsville, North Carolina	Cumberland Island, Georgia		
1-0	4-1	1-2	1-2	2-1
1-0	0-0	1-2	3-3	1-0
0-0	0-1	3-3 ¹⁵	1-0	4-4
0-0	1-1	1-2	1-1	5-3
2-1	3-2	3-2	3-2	2-1
		3-2	1-1	1-1
		2-4	1-1	

There is a great amount of variation in the depth of the general coloration, but in the vast majority the dark dorsal band is indicated. The Cumberland Island and numerous New Jersey specimens average dark in general tone, with generally strongly contrasted pattern. When fresh many specimens from these localities were distinctly thalassine in tone.

Distribution.—Salt marsh and maritime region from western Long Island, New York (Rockaway) to southern Georgia (Cumberland Island) and western Florida (Cedar Keys). It has been recorded inland in but a single instance, that from Gainesville, Florida, although two females labelled "Swansea, South Carolina," a locality approximately one hundred miles inland, are now in hand. We feel very doubtful, with our personal knowledge of the habits of this species, as to the correctness of these two records. The Gainesville one was reported by us when our knowledge of the insect was by no means as full as at present, and in all probability the specimen reported was secured the previous day at Cedar Keys and accidentally confused in labelling.

¹⁵The ventro-internal margins of the caudal femora have a single spine instead of being unarmed as usual.

Specimens Examined: 248; 112 ♂, 117 ♀, 6 juv. ♂, 13 juv. ♀.

Tuckerton, New Jersey, IX, 1, (W. T. Davis), 1 ♂, 1 ♀, [U. S. N. M.]. *Paratypes* of *O. cruseulum* Davis.

Ventnor, New Jersey, VIII, 24, 1914. (H.; common in and about tall fringing borders of *Spartina stricta* far out on tidal flats), 15 ♂, 17 ♀, 4 juv. ♂, 2 juv. ♀.

Ocean City, New Jersey, VIII, 14, 1914. (H.; middle of salt marsh), 5 ♂, 5 ♀.

Townsend's Inlet, New Jersey, VIII, 10, 1908. (H. Fox; in grassy marsh and grassy meadow), 2 ♀, [A. N. S. P.].

Avalon, New Jersey, VIII, 14, 1908. (H. Fox; in *Scirpus* near beach), 1 ♀, [A. N. S. P.]; VIII, 20, 1910, VIII, 12, 1911, VIII, 26, 1912. (H. Fox; in *Spartina* in salt marsh), 5 ♂, 16 ♀, 1 juv. ♀, [A. N. S. P.].

Ocean View, New Jersey, VIII, 12, 1908, VIII, 29, 1910. (H. Fox; grassy places in salt marsh), 1 ♂, 5 ♀. [A. N. S. P.].

Sea Isle City Turnpike, New Jersey, VIII, 12, 1911, VIII, 15, 1910. (H. Fox; in *Spartina* in salt marsh), 10 ♂, 11 ♀, 1 juv. ♂, 9 juv. ♀, [A. N. S. P.].

Goshen, New Jersey, VIII, 22, 1910. (H. Fox), 1 ♀, [A. N. S. P.].

South Dennisville, New Jersey, VIII, 27, 1912. (H. Fox; in *Spartina glabra*), 3 ♂, 1 ♀, [A. N. S. P.].

Cape May Court House, New Jersey, VIII, 14, 1914. (H.; in salt marsh in *Spartina stricta*), 1 ♂, 1 ♀.

Anglesea, New Jersey, IX, 8, 1 ♀, [A. N. S. P.].

Cape May, New Jersey, VII, 22, 1910. (H.; in salt marsh), 4 ♂, 3 ♀; VIII, 8, 1914. (H.; out on salt marsh in *Spartina stricta*), 3 ♂, 2 ♀.

Ocean View, Virginia, VIII, 9, (Caudell), 7 ♂, 1 ♀, 1 juv. ♂, 1 juv. ♀, [U. S. N. M. and A. N. S. P.].

Wrightsville, North Carolina, IX, 7, 1911. (R. & H.; scarce in marsh grass), 5 ♂, 10 ♀.

Swansea, South Carolina, VIII, 7, 1911. (F. Knab), 2 ♀, [U. S. N. M.].

Coast of South Carolina, 1 ♂, [A. N. S. P.].

Savannah, Georgia, VIII, 20, 1895. (A. Oemler), 1 ♀, [U. S. N. M.].

Tybee Island, Georgia, VII, 26, 1913. (J. C. Bradley), 2 ♂, 1 ♀, [Ga. State Clu.]; VIII, 13, 1903. (Morse), 8 ♂, 3 ♀, [Morse Clu.].

Cumberland Island, Georgia, VIII, 31, 1911. (H.; in high salt marsh grass growing between high and low tide beach lines on boggy ground), 41 ♂, 32 ♀.

The species has been recorded previously from Cedar Keys (and Gainesville, incorrectly) Florida; Rockaway and Staten Island, New York, and Tuckerton, Ocean View, Townsend's Inlet and Anglesea, New Jersey.

Orchelimum militare Rehn and Hebard (Figs. 14, 29, 57, 58 and 81.)

1907. *Orchelimum militare* Rehn and Hebard, Proc. Acad. Nat. Sci. Phila., 1907, p. 311, figs. 10 and 11. [Gainesville, Florida.]

This very distinct species has some relationship to *O. fidicinium*, but the sum total of its characters give it an isolated position.

In size it answers to the general rule of the genus, in that the smaller individuals are more frequent at the more northern local-

ities and the average size southward is greater, but the Florence series is sufficient to show that the individual size variation is very great.

As with *glaberrimum* this species occasionally develops a reddish coloration of the head, as rich and decided as in the most extreme individual of the larger species, while other specimens of *militare* have a vertical facial bar ranging in color from pale reddish to walnut brown, which condition is quite similar to that frequently found in *O. concinnum*. This facial marking occasionally spreads out laterad over the ventral portion of the genae and again in some few specimens the infra-ocular and infra-antennal regions are quite blackish.

The number of spines on the distal portion of the ventro-external margin of the caudal femora either varies from one to two or the margin is unarmed. A count of twenty specimens shows the following results:

Florence, South Carolina		Winter Park, North Carolina	
0-0	0-0	0-0	0-2
2-2	1-1	0-0	1-0
2-1	2-1	1-0	0-0
0-0	1-1	0-0	0-0
0-0	0-1	0-0	1-1

Distribution.—Coastal Plain region. Gulf coast and Florida, ranging from south-central New Jersey (Speedwell) south to southern Florida (Detroit), west at least as far as southern Mississippi (Nugent) and southeastern Louisiana (Buras). The known limits of its range inland toward the Piedmont region are Florence, South Carolina, and Tifton, Georgia.

Specimens Examined: 74; 45 ♂, 28 ♀, 1 juv. ♀.

Speedwell, New Jersey, VIII, 31, 1905, (Witmer Stone), 1 ♂. [A. N. S. P.]¹².

Winter Park, North Carolina, IX, 7, 1911, (R. & H.; in green grasses on edge of field), 12 ♂, 2 ♀.

Lake Waccamaw, North Carolina, IX, 8, 1911, (R. & H.; in high weeds near lake shore), 1 ♂, 2 ♀.

Florence, South Carolina, IX, 6, 1911, (R. & H.; in open places in short-leaf pine or oak woods, in grasses several feet high), 15 ♂, 10 ♀.

Jesup, Georgia, IX, 1, 1911, (H.; in bulrushes in swamp in pine woods), 2 ♂, 2 ♀.

¹² This specimen was recorded by Smith (1909 List of New Jersey Insects) under *O. herbaceum*.

¹³ This specimen was seen to dive off of the rushes into the water and swim swiftly to a leaf under which it clung, being perfectly concealed an inch or more under water.

- Waycross, Georgia, VIII, 11, 1903, (Morse), 2 ♂, 2 ♀, [Morse Cln.].
 Jordan's, Billy's Island, Georgia, VIII, 31, 1913, (J. C. Bradley), 1 ♂, 1 ♀.
 Homerville, Georgia, VIII, 27, 1911, (R. & H.), 1 juv. ♀.
 Tifton, Georgia, IX, 8, 1910, (J. C. Bradley), 1 ♂. [Ga. State Cln.].
 Bainbridge, Georgia, IX, 17 to X, 19, 1910, (J. C. Bradley), 1 ♀, [Ga. State Cln.].
 Jacksonville, Florida, (Pridley), 1 ♂; VIII, 1885, (Ashmead), 1 ♂, [Hebard Cln.].
 Atlantic Beach, Florida, VIII, 24, 1911, (R. & H.); swampy area on edge of hammock). 1 ♀.
 Hastings, Florida, V, 22 to X, 15, (A. G. Brown), 8 ♂, 4 ♀, [Morse Cln.].
 Nugent, Mississippi, VII, 20, 1905, (Morse), 1 ♂, 3 ♀, [Morse Cln.].
 Buras, Louisiana, VII, 23, 1905, (Morse), 1 ♂, [Morse Cln.].
- We have previously recorded this species from Gainesville and Detroit, Florida; Okefenokee Swamp, Georgia, and Winter Park, North Carolina.

Orchelimum volantum McNeill (Figs. 15, 30, 59, 60 and 82.)

1891. *Orchelimum volantum* McNeill, Psyche, vi, p. 26. [Rock River near Cleveland, Henry County, Illinois.]
 1893. *Orchelimum bruneri* Blatchley, Canad. Entom. xxv, p. 92. [Vigo County, Indiana.]

The above synonymy has been established by Blatchley after the examination of typical material on which the two names were based.²¹ The paired dark lines on the dorsum of the head and pronotum are indicated in the majority of the specimens, occasionally, however, entirely absent.

The ventro-external margin of the caudal femora shows from one to four spines present distad, eight specimens, which possess one or both caudal limbs, showing the following formulae; 3-4, 2-4, 2-4, 2-1, 2-3, 2-3, 3-?, 3-?.

Distribution.—North-central Mississippi and lower Missouri valleys, southern Great Lake region; from south-central Ontario (Niagara River) and northern Ohio (Cedar Point), west to eastern Nebraska (Cedar Bluffs) and Kansas (Douglas County), the latter and Vigo County, Indiana, being the most southern localities, while Sarnia, Ontario is the most northern point from which it is known.

Specimens Examined: 15; 4 ♂, 11 ♀.

- Point Pelee, Ontario, VIII, 8, 1901, (E. M. Walker), 1 ♂, 1 ♀, [A. N. S. P.].
 Lake Maxinkuckee, Indiana, VIII, 17, 1893, (W. S. Blatchley), 1 ♂, 2 ♀, [Morse Cln., U. S. N. M. and M. C. Z.]. *Paratypes* of *O. bruneri* Blatchley.

²¹ Orthopt. of Indiana, p. 394, (1903).

Vigo County, Indiana, VIII, 17 and 18, IX, 28 and X, 1, 1893. (W. S. Blatchley), 1 ♂, 5 ♀, [Hebard Ch. and U. S. N. M.]. *Paratypes of O. braueri*. Iowa City, Iowa, (Shimek), 3 ♀, [Hebard Ch.]. Cedar Bluffs, Iowa, 1 ♂, [Hebard Ch.].

Orchelimum bradleyi new species (Figs. 4, 31, 61, 62 and 83.)

1911. *Orchelimum volantum* Rehn and Hebard (not *Orchelimum volantum* McNeill, 1891). Proc. Acad. Nat. Sci. Phila., 1910, p. 595. [Okkefenokee Swamp, Georgia.]
 1911. *Orchelimum volantum* Sherman and Brimley (not McNeill, 1891), Entom. News, xxii, p. 391. [Wilmington, North Carolina.]

The acquisition of male individuals of this striking species, and the ability to judge the constancy of the ovipositor characters previously pointed out (vide supra), enable us to differentiate the present form from its nearest ally, the interior *volantum*. While the general form is very similar the new species is distinctly the larger, the cephalic and median femora are more distinctly tapering and the caudal femora are slightly more inflated proximad. In the male sex the differential characters are cereal, the new form having the cereus more attenuate distad, mesad more inflated on the dorsal surface and with the median tooth decidedly proximal in position and directed more ventro-proximad. Another cereal feature in the new form is the decided depression at the base of the tooth. In the female sex the ovipositor of *bradleyi* is similar in general character and dorsal curve to that of *volantum*, but it is narrow disto-mesad with the ventral margin regularly and gently arcuate.

Type.—♂; Chase Prairie, Okkefenokee Swamp, Georgia. September 5, 1913. (J. Chester Bradley.) [Acad. Nat. Sci. Phila., Type no. 5242.]

Description of Type.—Size medium; form elongate, slender. Head with the fastigium roundly and appreciably elevated dorsad of the occiput, as in *volantum* regularly rounding, when seen from the lateral aspect, to the interfastigial suture, narrow, ventral portion with the adjacent facial fastigium strongly compressed; eyes subovate in basal outline, moderately prominent when seen from the dorsum; antennae at least two and one-half times as long as the body. Pronotum with the dorsal outline of the metanotum moderately ascending caudad; cephalic margin of the pronotum emarginato-truncate, caudal margin moderately arcuate; prozona slightly more than one and one-half times the length of the metazona, greatest dorsal width of metazona four-fifths the dorsal length of the entire pronotum; lateral lobes of the pronotum with the greatest dorsal length of the lobes subequal to their greatest depth, ventro-cephalic angle obtusely-rounded, ventral margin oblique, straight, ventro-cephalic

angle rotundato-obtuse-angulate, caudal margin arcuate but slightly flattened ventrad, humeral sinus distinct, broad, convex callosity of lateral lobes broad, elliptical. Tegmina nearly one and one-half times as long as the caudal femora, elongate lanceolate, moderately acute; structure of the stridulating field as in *volantum*. Wings surpassing the tegmina by about half the pronotal length. Cerci elongate, robust, distal portion tapering, internal tooth place distinctly proximad of the middle, the tooth depressed, directed ventro-proximad and moderately acute, the distal portion of the tooth alone tapering, the proximal portion subequal in width, dorsal surface of cercal shaft inflated dorso-mesad, this developed proximad into a carinate ridge which curves around the base of the tooth, distal portion of shaft depressed, tapering and with the apex gently incurved; subgenital plate full, lateral margins arcuate, distal margin very shallowly obtuse-angulate emarginate, styles articulate, slender. Cephalic and median femora very appreciable tapering distad; caudal femora considerably inflated proximad, very slender distad, distal portion of ventro-external margins armed with two to three spines.

Allotype.—♀; Same data as the type.

Description of Allotype.—Differing from the description of the male in the following features. Ovipositor very slightly longer than half the caudal femoral length, rather heavy, dorsal margin nearly straight, ventral margin straight proximad, gently arcuate distad, apex very acute, width subequal in proximal five-eighths. Subgenital plate simple, narrowly emarginate disto-mesad.

Paratyptic Series.—We have in addition to the type and allotype a paratyptic series of four males from the type locality.

Measurements (in millimeters)

	♂			
	(Type)	Chase Prairie, Georgia (Paratype)	Chase Prairie, Georgia (Paratype)	Chase Prairie, Georgia (Paratype)
Length of body	23.2	21	25	23.2
Length of pronotum	4.9	4.8	4.8	5
Length of tegmen	26.8	25.7	26	27.7
Length of wing distad of tegmen	2.7	3	2.8	2.6
Length of caudal femur	20	19.5	19	19.2

	♀			
	Wilmington, North Carolina	Chase Prairie, Georgia (Allotype)	Okefenokee Swamp, Georgia	Jacksonville, Florida
Length of body	18 ²²	23.2	21.5	23.6
Length of pronotum	5.2	5	4.9	5
Length of tegmen	28.9	26	26.1	28.6
Length of wing distad of tegmen	1.6	broken	2.5	2.7
Length of caudal femur	21.2	18.9	20.2	19.2
Length of ovipositor	11.3	10.1	10.7	11.5

²² Greatly shrivelled.

Color Notes.—General color (in well preserved specimens) light paris green to light oriental green, becoming more biscay green on the caudal limbs. Dorsum of head occasionally, and of pronotum and stridulating field of tegmina always, more or less ochraceous-buff; as far as the present material goes always bearing on the prozona a pair of brownish (russet to bone-brown) lines, which become weakened on the metazona and there diverge; these lines are rarely present on the occiput. Eyes chocolate. Antennae ochraceous-orange, each joint uni-annulate with bone brown. Abdominal appendages of male washed with honey yellow. Ovipositor weakly washed with kaiser brown or unicolorous with the body. Tibial spines black tipped.

Morphological Notes.—The number of spines on the ventro-external margins of the caudal femora varies from one to four.

Biological Notes.—Dr. J. Chester Bradley, in whose honor we have named the species and who collected the typical material, has supplied us with the following notes on the habits of these insects. "In the eastern half of the Okefenokee Swamp are extensive so-called prairies. These are really inundated plains grown up with sawgrass, maiden-cane, or in places open shallow lakes covered with a multitude of water plants. The natives of the Okefenokee told us of diving grasshoppers which lived on these prairies, and in making a trip to the Chase Prairies in September 1913, I found these grasshoppers in great abundance in the grasslike plants growing out of the water or growing along the banks of the old canal. As the boat approached them they jumped from the grass into the water, completely disappearing, and so quick were they to do this when alarmed that it was only after some difficulty that we succeeded in catching a series of specimens."

Distribution.—Extending from southeastern North Carolina (Wilmington) south to northern Florida (Jacksonville and Tallahassee), inland as far as the Okefenokee Swamp, southern Georgia.

Specimens Examined: 10; 6 ♂, 4 ♀.

Wilmington, North Carolina, VIII, 1, 1 ♀, [Davis Cln.]

Okefenokee Swamp, Georgia, IX, 10, (J. C. Bradley), 1 ♀, [A. N. S. P.]

Chase Prairie, Okefenokee Swamp, Georgia, IX, 5, 1913, (J. C. Bradley), 5 ♂, 1 ♀, [A. N. S. P., Hebard Cln. and Cornell University]. *Type, allotype and paratypes.*

Jacksonville, Florida, (Priddey) 1 ♀, [Hebard Cln.].
Tallahassee, Florida, (T. Glover), 1 ♂, [M. C. Z.].

Orchelimum superbum new species (Figs. 5, 32, 63 and 64.)

1914. *Orchelimum glaberrimum* Fox, (not of Burmeister, 1838), Proc. Acad. Nat. Sci. Phila., 1914, p. 526. (Part.) [Between Winslow and Folsom, New Jersey.]

A very distinct species belonging to the same subgenus as *fraternum* and *unispina*, but also showing tendencies toward *bradleyi*. In the unispinose genicular lobes of the caudal femora it shows affinity to *fraternum* and *unispina*, but the much greater size, form of the stridulating field of the male tegmina and other features remove it from their immediate vicinity. Of the two it is nearer *unispina*, which, however, also differs from *superbum* in having acuminate cerci in the male. It resembles *bradleyi* somewhat in general plan of the stridulating field but the details are quite different and the cerci and lateral lobes of the pronotum as well as the caudal genicular spines are different from those found in *bradleyi*. The female sex is not known.

Type.—♂; Winslow Junction, Camden County, New Jersey. July 8, 1911. (Henry Fox; in bog toward Folsom along Cape May Division of Atl. City R. R.) [Acad. Nat. Sci. Phila., Type no. 5266.]

Description of Type.—Size moderately large; form subcompressed, elongate. Head with the plane of the occiput and fastigium horizontal, the latter well rounded into the outline of the moderately retreating face when viewed from the lateral aspect; fastigium moderately broad, arcuate dorsad in transverse section, cephalic outline blunt arcuate, the lateral margins, when seen from the cephalic aspect, moderately concavo-arcuate convergent ventrad, the ventral point truncate and closely in contact with the fastigium of the face; eyes nearly circular in basal outline, which is fairly flattened cephalad, the depth of the eye but faintly more than half that of the infra-ocular portion of the genae, when viewed from the dorsum the eyes are not prominent and are appreciably flattened; antennae at least twice as long as the body, proximal joint with a very distinct distal rounded lobe on the internal face. Pronotum faintly sellate, the dorsal line, when seen from the lateral aspect, horizontal on the prozona and faintly ascending on the metazona, the greatest dorsal width of disk of pronotum contained one and one-half times in the length of same; cephalic margin of pronotal disk very faintly arcuato-emarginate, caudal margin of pronotal disk regularly arcuate; prozona constituting slightly less than two-thirds the length of the pronotal disk, separated from the metazona by a weakly impressed transverse depression, a weak medio-longitudinal sulcus faintly indicated on the caudal section of the prozona and somewhat more strongly on the metazona; lateral lobes of the pronotum broadly rounding into

the prozonal disk and separated from the dorsal surface by a distinct but rounded shoulder on the metazona, in outline the lobes are as deep as the greatest dorsal length of the same, cephalic margin broadly rounding into the straight and very oblique ventral margin, ventro-caudal angle narrowly rounded acute-angulate, caudal margin extending slightly ventro-cephalad in direction but nearly vertical, straight with a very faint sinuosity, no distinct humeral sinus present, convex callosity elongate, narrow. Tegmina elongate, sublanceolate, surpassing the apex of the abdomen by the combined length of the head and pronotum, distal half of the tegmina appreciably narrower than the proximal portion, apex narrowly rounded; stridulating area shorter than the dorsum of the pronotum, no wider than the same, stridulating vein nearly transverse, strongly thickened toward the humeral trunk, the greatest width of the speculum, *i. e.*, along the stridulating vein, contained nearly one and one-half times in the greatest length of the same. Wings very briefly surpassing the tips of the tegmina. Cerci with the portion proximad of the tooth short and relatively slender, the median portion very robust and inflated, the distal extremity subdepressed, an indication of a carina is present on the dorsal surface proximad of the tooth, the latter internal in position and ventro-cephalic in trend, in length subequal to the section of the cereal shaft proximad of the tooth, tapering, the immediate apex sharply acuminate and uncinata, median inflation of shaft bulbous, apex of shaft very bluntly narrowing, slightly directed inwards, internal margin of that portion faintly arcuate-concave, the plane of depression tilted ventro-laterad; subgenital plate obtuse-angulate emarginate, styles rather short, slightly tapering, ventral surface of plate moderately tricarinate, the median one much stronger than those extending from the style bases. Cephalic and median tibiae each with six pairs of spines. Caudal femora equal to about three-fourths of the tegminal length, considerably inflated proximad but passing evenly and gradually into the slender distal portion, genicular lobes unispinose, ventral margins unarmed; caudal tibiae with margins well spined.

Paratype Series.—We have selected the type from a series of four males bearing the same data and one male from Sewell, Gloucester County, New Jersey, taken July 10, 1910, by Dr. Henry Fox. The four specimens other than the type we indicate as paratypes.

Measurements (in millimeters)

♂	Length of body	Length of pronotum	Length of tegmen	Length of caudal femur
Winslow Junction, New Jersey <i>Type</i>	24.6	6	24.4	18
Winslow Junction, New Jersey <i>Paratype</i>	24.5	6.1	25.4	18.2
Winslow Junction, New Jersey <i>Paratype</i>	23	6	25	17.5
Sewell, New Jersey <i>Paratype</i>	19.6	5	22	15.9

Color Notes.—General color ranging from lime green to light cress green, the discoidal and stridulating fields of the tegmina weakly washed with wood brown, the usual longitudinal expanding bar on the dorsum of the head and pronotum hazel to russet on the pronotum, becoming obsolete on the metazona and intensified on the head, the paired bordering lines on the pronotum bone brown, sharply pencilled, moderately broad and slightly converging caudad on the metazona, contrasted laterad by a yellowish wash, the dark lines subobsolete on the head. Tegmina with the veins of the costal section of the marginal field sulphate green, the distal section of the same field toward the humeral trunk, including the mediastine vein, lined in similar fashion with acajou red, area of the humeral trunk weakly lined with buff-yellow. Abdomen with a broad subequal medio-longitudinal bar of claret brown of variable intensity, this bordered laterad by distinct but narrow lines of buff-yellow, these varying in intensity and continuity. Eyes auburn to chestnut. Antennae with the proximal joint of the general color, the remainder washed with auburn to bay, becoming stronger distad. Cerci pale ochraceous-orange, more or less washed distad and mesad with ferruginous. Caudal tibiae washed with russet, the spines black with pale bases.

Distribution.—The species is only known from two localities in or along the western edge of the Pine Barren area of southern New Jersey.

Biological Notes.—All the material known of this species was taken in bogs or reedy swamps. At Sewell, according to information with the specimen taken at that locality, several individuals were heard singing.

Morphological Notes.—The specimens examined are quite uniform in structure, the only variation being in size and this is probably geographic, as those individuals from the type locality are of very similar size, while that from Sewell is distinctly smaller.

Specimens Examined: 5 ♂.

Sewell, New Jersey, VII, 10, 1910, (H. Fox; in reedy swamp), 1 ♂, *paratype*, [A. N. S. P.].

Winslow Junction, New Jersey, VII, 8, 1911, (H. Fox; in bog), 4 ♂, *type* and *paratypes*, [A. N. S. P.].

Orchelimum fraternum new species (Figs. 16, 33, 65 and 66.)

As shown in the key this is a species related to *O. unispina*, differing in the possession of a distinct though shallow humeral sinus to the lateral lobes of the pronotum, in the relatively greater width of the same lateral lobes, in the relatively broader convex callosity of the lobes and in the relatively blunter and less attenuate cerci of the male.

Type.—♂; Guadalajara, State of Jalisco, Mexico. (D. L. Crawford.) [Acad. of Nat. Sci. Phila., Type no. 5269.]

Description of Type.—Size medium; form moderately robust, subcompressed. Head with the line of the occiput and fastigium on a plane with that of the dorsum of the pronotum when seen from the side, the fastigial outline well rounding into the subarcuate and but moderately retreating facial outline; fastigium heavy, when viewed from the dorsum appreciably thicker than the width of the proximal antennal joint, when seen from the facial aspect the lateral margins of the fastigium are strongly arcuato-concave convergent ventrad, rather narrowly in contact with the facial fastigium, the interfastigial suture arcuate, the fastigium of the face narrow; eyes subcircular in basal outline, this flattened cephalad, in depth the eyes are equal to about one and one-half times that of the infra-ocular portion of the genae, when viewed from the dorsum the eyes are but little prominent and somewhat flattened; antennae at least twice as long as the body, proximal joint with a distinct rounded projection distad on the internal margin. Pronotum when seen from the side with the dorsal line nearly straight, very faintly ascending caudad on the metazona, greatest dorsal width (caudad) of pronotal disk contained about one and two-fifths time in the dorsal length, on the prozona the disk rounds laterad into the lateral lobes but is separated on the metazona by distinct though rounded shoulders; cephalic margin of pronotal disk faintly emarginate, caudal margin of pronotal disk arcuate, slightly flattened mesad, prozona nearly twice the length of the metazona, separated by a distinct but not very deep transverse impression, faint indications of a medio-longitudinal sulcus present on the prozona, this being continuous though slight on the metazona; lateral lobes of the pronotum with their greatest dorsal length slightly surpassing the greatest depth of the lobes, cephalic margin of lobes moderately oblique, truncate, passing into the sinuato-truncate ventral margin by a well rounded obtuse angle, ventro-caudal angle narrowly rounded, rectangulate, caudal margin oblique truncate, with a distinct and broad though shallow humeral sinus, convex callosity distinct, elongate elliptical, with its greatest width contained about three times in its length. Tegmina decidedly surpassing the apex of the abdomen and falling short of the apices of the caudal femora by about the same distance, elongate lanceolate, the margins regularly converging in their distal two-thirds, apex acuminate with the extremity very narrowly rounded; stridulating field relatively small, distinctly shorter than the pronotal disk and not quite as wide as the greatest width of the same, stridulating vein nearly straight, slender, subequal in width. Wings slightly surpassing

the tegminal apices. Prosternum bispinose. Cerci acuminate, straight, the section of the shaft proximad of the tooth more slender than the median portion, which is subinflated, tooth placed at about the proximal third on the internal face and directed cephalo-laterad, the tooth being subequal in length to the proximal portion of the shaft, greatly thickened at the base and with a very slender and subspiniform apex, median portion of shaft subequal in width, the distal third tapering with the immediate apex blunt; subgenital plate with the distal margin subtruncate, styles small, slender and tapering, ventral surface of plate with a weak median and much thicker paired lateral carinae. Caudal femora slightly shorter than the body length, slightly surpassing the tips of the wings, strongly inflated in the proximal half and regularly tapering to the slender distal portion, ventral margins unarmed, genicular lobes very briefly and rather bluntly unispinose.

The type specimen is unique.

Measurements of Type (in millimeters).—Length of body, 18.2; length of pronotum, 4.9; length of tegmen, 16.6; length of caudal femur, 16.1.

Color Notes.—General color on the lateral lobes of the pronotum and on the abdomen kildare green, passing into mignonette green on the limbs and chrysolite green on the face and genae, the apex of the abdomen passing into chamois. Dorsum of the fastigium, occiput and dorsum of pronotum snuff brown, becoming tawny-olive on the middle of the pronotal disk, a fine median dividing line of the general color present on the head, while on the pronotum the distinct dark bordering margins of the area and a continuation of the dividing line of the head are seal brown, the lateral bordering sections regularly arcuato-convex and thus converging caudad as well as cephalad. Cerci weakly washed distad with indian red. Dorsal tibial spines black for the greater portion of their length, ventral tibial spines with black less extensive. Eyes vinaceous-tawny. Antennae, except the two proximal joints, ferruginous, sparsely annulate with seal brown.

Distribution.—This species is only known from the type locality in western Mexico-Guadalajara, state of Jalisco.

Remarks.—This species is quite close to *O. unispina* and additional material may show them to be inseparable specifically, but at the present writing we have found no indications elsewhere in the genus, of variation sufficiently decided to cover the differences in the character of the humeral sinus and of the cerci seen in these two forms. There is no alternative to our present course but to arbitrarily consider them to be the same form, which would not be warranted by our knowledge of the general fixity within

the genus, of the features here given as diagnostic of this form. The species is, however, from a locality at which *unispina* also occurs.

Specimens Examined: 1 ♂.

Guadalajara, Jalisco, Mexico, (D. L. Crawford), 1 ♂, *type*, [A. N. S. P.].

Orchelimum unispina (Saussure and Pictet) (Figs. 17, 34, 67 and 68.)

1898. *Xiphidium unispina* Saussure and Pictet, Biol. Cent.-Amer., Orth., i, p. 398. [Jalisco and Orizaba, Mexico.]

This species was originally described as a species of *Xiphidium* (= *Conocephalus* as at present restricted), but it is clearly a member of the genus *Orchelimum*, although belonging to a subgenus which approaches *Conocephalus*. Saussure and Pictet described only the male sex, but by a lapsus calami they give the sex of the measured material as female.

It is evident that this species shows considerable variability in tegminal and wing length, the original material having had the tegmina surpassing the caudal femora and the wings surpassing the tegmina, while the only adult seen by us has the tegmina decidedly failing to reach the tips of the caudal femora and the wings subequal to the tegmina distad.

Measurements (in millimeters)

♂	Length of body	Length of pronotum	Length of tegmen	Length of caudal femur
Jalisco or Orizaba, Mexico. (Ex Saussure and Pictet)				
<i>Types</i>	17	4	20	15
Guadalajara, Mexico.....	18.2	4.5	14	13.7

We have before us a male in the second instar preceding maturity, and this shows that the cerci do not develop their characteristic structure until the last or next to the last ecdysis.

This species is known only from central and south central Mexico, the records being from Orizaba, state of Vera Cruz, and the state of Jalisco, and specifically Guadalajara and Ocotlan in the latter state.

Specimens Examined: 2; 1 ♂, 1 juv. ♂.

Guadalajara, Jalisco, Mexico, (D. L. Crawford), 1 ♂, [A. N. S. P.].

Ocotlan, Jalisco, Mexico, 5000 feet elevation, VIII, 29 to IX, 1, 1906. (P. P. Calvert), 1 juv. ♂, [A. N. S. P.].

EXPLANATION OF PLATES

Plate I

- Fig. 1.—*Orchelimum calcaratum*. Lateral outline of *type*. San Antonio, Texas. ($\times 2$)
- Fig. 2.—*Orchelimum bullatum*. Lateral outline of *type*. Galveston, Texas. ($\times 2$)
- Fig. 3.—*Orchelimum minor*. Lateral outline of male. Stafford's Forge, New Jersey. ($\times 2$)
- Fig. 4.—*Orchelimum bradleyi*. Lateral outline of *type*. Chase Prairie, Georgia. ($\times 2$)
- Fig. 5.—*Orchelimum superbum*. Lateral outline of *type*. Winslow Junction, New Jersey. ($\times 2$)
- Outlines of lateral lobe of pronotum of male. ($\times 3$)
- Fig. 6.—*Orchelimum agile*. Tinicum, Pennsylvania.
- Fig. 7.—*Orchelimum glaberrimum*. Florence, South Carolina.
- Fig. 8.—*Orchelimum vulgare*. Marion, Massachusetts.
- Fig. 9.—*Orchelimum gladiator*. West Point, Nebraska.
- Fig. 10.—*Orchelimum laticauda*. Washington, D. C.
- Fig. 11.—*Orchelimum nigripes*. Victoria, Texas.
- Fig. 12.—*Orchelimum concinnum*. Rye Beach, New Hampshire.

Plate II

- Outlines of lateral lobe of pronotum of male. ($\times 3$)
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- Fig. 14.—*Orchelimum militare*. *Type*. Gainesville, Florida.
- Fig. 15.—*Orchelimum volantum*. Cedar Bluffs, Nebraska.
- Fig. 16.—*Orchelimum fraternum*. *Type*. Guadalajara, Mexico.
- Fig. 17.—*Orchelimum unispina*. Lateral outline of male. Guadalajara, Mexico. ($\times 2$)
- Outlines of stridulating field of male. ($\times 3$)
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- Fig. 21.—*Orchelimum gladiator*. West Point, Nebraska.
- Fig. 22.—*Orchelimum calcaratum*. *Type*. San Antonio, Texas.
- Fig. 23.—*Orchelimum bullatum*. *Type*. Galveston, Texas.
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- Fig. 25.—*Orchelimum nigripes*. Victoria, Texas.
- Fig. 26.—*Orchelimum minor*. Stafford's Forge, New Jersey.
- Fig. 27.—*Orchelimum concinnum*. Rye Beach, New Hampshire.
- Fig. 28.—*Orchelimum fidicinium*. *Type*. Cedar Keys, Florida.
- Fig. 29.—*Orchelimum militare*. *Type*. Gainesville, Florida.
- Fig. 30.—*Orchelimum volantum*. Cedar Bluffs, Nebraska.
- Fig. 31.—*Orchelimum bradleyi*. *Type*. Chase Prairie, Georgia.
- Fig. 32.—*Orchelimum superbum*. *Type*. Winslow Junction, New Jersey.
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- Fig. 34.—*Orchelimum unispina*. Guadalajara, Mexico.

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Dorsal (first) and lateral (second) outlines of left cercus of male. ($\times 10$)

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 Figs. 43 and 44.—*Orchelimum calcaratum*. Type. San Antonio, Texas.
 Figs. 45 and 46.—*Orchelimum bullatum*. Type. Galveston, Texas.
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 Figs. 49 and 50.—*Orchelimum nigripes*. Victoria, Texas.
 Figs. 51 and 52.—*Orchelimum minor*. Stafford's Forge, New Jersey.
 Figs. 53 and 54.—*Orchelimum concinnum*. Rye Beach, New Hampshire.
 Figs. 55 and 56.—*Orchelimum fidicinium*. Type. Cedar Keys, Florida.
 Figs. 57 and 58. *Orchelimum militare*. Type. Gainesville, Florida.

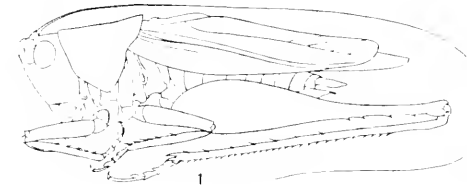
Plate IV

Dorsal (first) and lateral (second) outlines of left cercus of male. ($\times 10$)

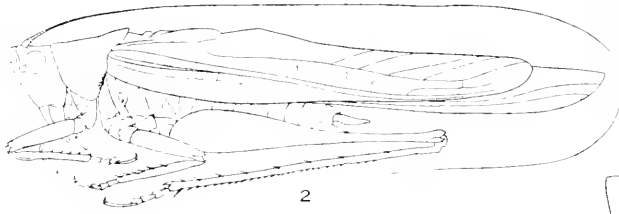
- Figs. 59 and 60.—*Orchelimum volantum*. Cedar Bluffs, Nebraska.
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Outlines of ovipositor of female. ($\times 2$)

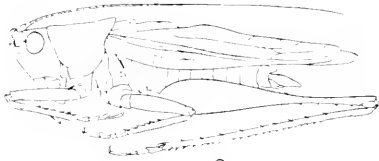
- Fig. 69.—*Orchelimum agile*. Tinicum, Pennsylvania.
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 Fig. 78.—*Orchelimum concinnum*. Rye Beach, New Hampshire.
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 Fig. 83.—*Orchelimum bradleyi*. Allotype. Chase Prairie, Georgia.



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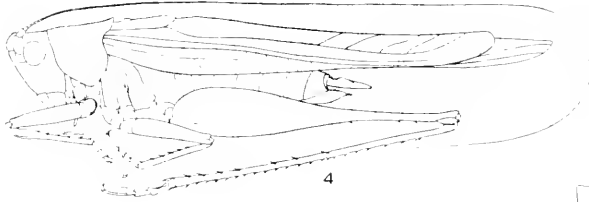
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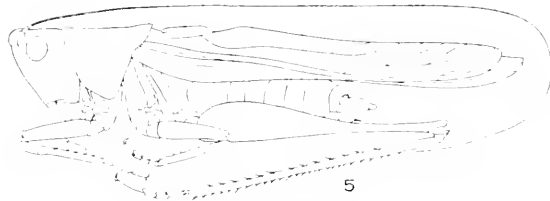
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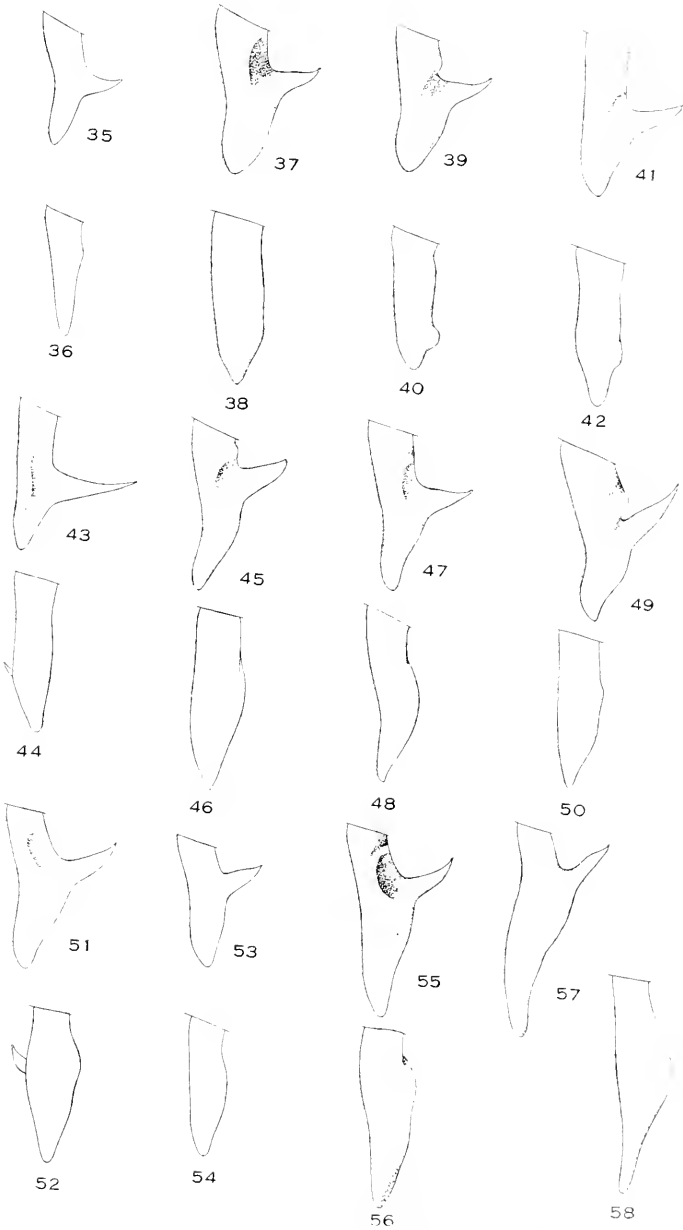


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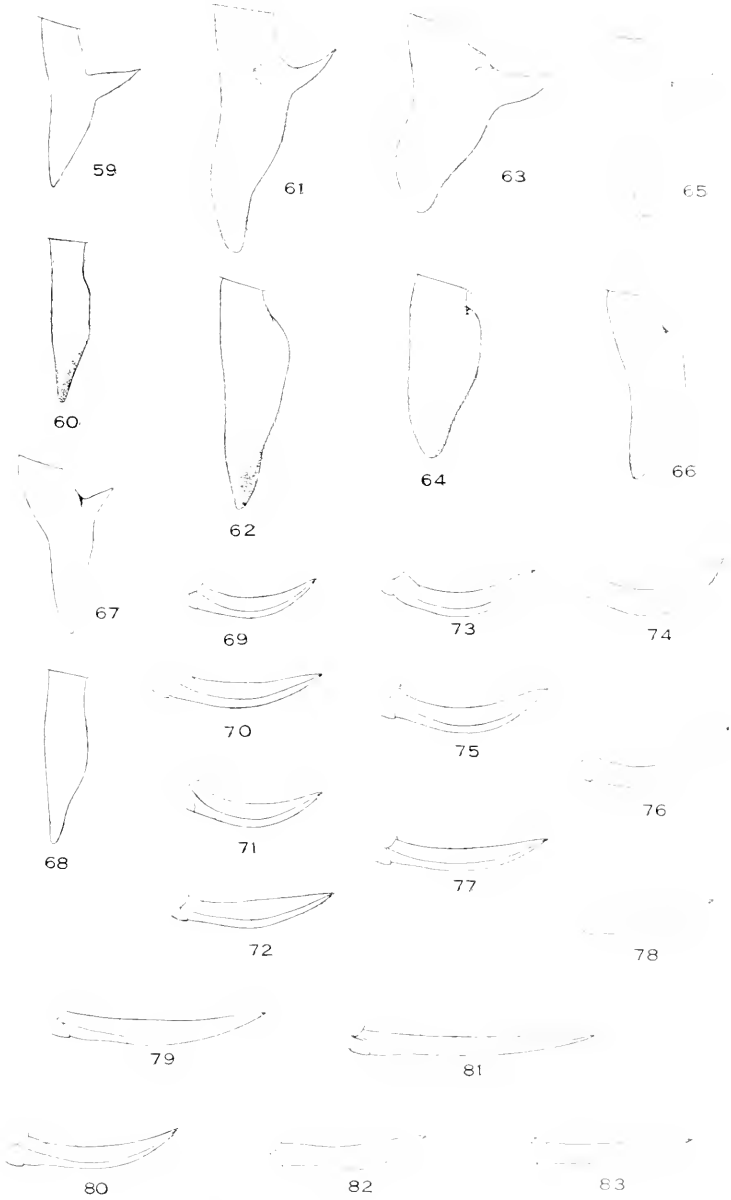


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REHN AND HEBARD-- AMERICAN TETTIGONIIDAE



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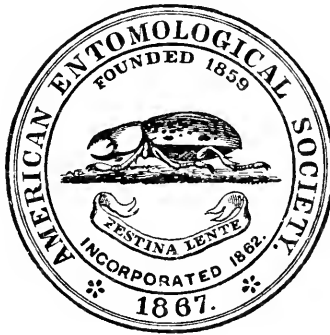
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PHILADELPHIA

SUBSCRIPTION PRICE FOUR DOLLARS PER VOLUME



MISCELLANEOUS APHID NOTES, CHIEFLY FROM OREGON

BY H. F. WILSON

Unless otherwise stated, the types of the new species described in these Notes are in the private collection of the author.

I. LIFE HISTORY NOTES ON PROCIPHILUS FRAXINI-DIPETALAE ESSIG¹

That the Pemphiginids in the genus *Prociphilus* and feeding on ash have the conifers for their alternate food plants, was demonstrated in Europe a number of years ago. In the fall of 1909, the writer, in an attempt to trace a winged aphid which was flying through the air in great numbers at Washington, D. C., located them on the roots of the white pine, *Pinus strobus*, and as this species was later found to develop on *Fraxinus* sp.,² the writer was able to work out the relationship of the present species on *Fraxinus oregona* Nuttall and *Pseudotsuga taxifolia* (Poir) Brit., in Oregon.

Each spring there appears on the leaves of the ash a purplish globose aphid which causes the leaves to curl and assume a gall-like formation. Inside the curled leaves these early spring forms, the stem mothers, produce alive a number of young greenish aphids which become mature pupae about the last of May, and attaining wings, usually disappear about the first week in June. These winged forms supposedly³ go to the roots of Douglas fir and

¹ In Europe there are two similar Pemphiginids on ash; owing to a lack of sufficient material, the author is unable at this time to compare the American species with European forms; but as there seems to be practically no distinguishing characters between them, the American species may prove to be the same as those in Europe.

² This species was later described as *P. venafuscus* by Dr. Edith M. Patch, Entomologist of the Maine Experiment Station.

³ The writer has tried for three years to colonize the alate form from the ash on Douglas fir for seedlings, but without success. The migratory forms from this latter plant have been transferred to ash seedlings with the successful production of eggs and the stem mothers the following spring.

produce alive a number of pale whitish young, which develop into apterous viviparous females and are the first of a series of summer generations.

In the fall, part of the aphids then present on the roots migrate to the ash and produce alive the sexual forms. Those remaining do not acquire wings but continue feeding, and one can find these apterous viviparous forms present on the roots in all stages throughout the year. The sexual forms are minute, brownish, and have no mouth parts. After copulation, each female produces a single elongate egg. In this stage the insect is carried over the winter on the ash.

A second species which has been imported into this state (Oregon) on red and white ash, the writer is calling *Prociphilus bumeliae* Schrank. This species seems to be entirely distinct from the first species, in that it feeds on the tips of the shoots and does not ordinarily get on to the leaves. The stem mothers of the two are quite similar, but the migratory forms show a decided difference in several ways. A description of the various stages of *Prociphilus fraxini-diptaliae* Essig follows:

Stem mother: Globose, body nearly as wide as long. General color chocolate brown and mottled with green above. Sutures between body segments dark green. Head and legs black, antennae black at the base, light brown toward the tip. Each eye is composed of three smaller eyes. The wax plates on the head are very variable in that the two larger ones at the base of each section of the occiput oftentimes merge into one long plate, the smaller ones varying in number from five to six, and apparently without regular size or position. Those on the body are in series of six to each segment and are more or less regular in position.

Measurements: Length of body, 4 mm.; width, 2.75 mm. Length of antennal segments, I, 0.09 mm.; II, 0.11 mm.; III, 0.176 mm.; IV, 0.11 mm.; V, 0.09 mm.; VI, 0.135 mm.; spur, 0.05 mm.; total length, 0.75 mm.

Pupa: General color lemon yellow, except the wing pads which are dusky. The entire body above is covered with long waxy white threads which have a blue tinge. When they are about ready to change to alate forms, they become a littler darker in color with occasional pinkish and bluish variations. Each abdominal segment with a row of six oblong wax plates. Cauda, short and broad, rounded at the tip. Color black to dusky. Length of body, 3 to 4 mm.; width, 2 mm.

Spring migrant (Plate V, fig. 1): General color bluish green with the entire body pulverulent. The legs, antennae and thorax are bluish black; the abdomen is dark greenish blue. On account of the fact that the waxy threads on the body of the insect are easily rubbed off, it is hard to tell just how much of this

material should be present, but in all specimens examined, only long threads were found along the sides and at the tip of the abdomen. The wax plates are apparently limited to two on the head at the base of the occiput, four on the prothorax, two at the top and center and one on each side, and two large plates on the mesothorax, one on each side of the median line, and at the base of the segment. The wings are hyaline with the stigma dusky at the thinner portion to black at the thicker.

Measurements: Length of body, 3.8 mm.; width, 1.8 mm. Length of antennal segments: I, 0.066 mm.; II, 0.09 mm.; III, 0.49 mm.; IV, 0.242 mm.; V, 0.3 mm.; VI, 0.3 mm.; spur, 0.066 mm.; wing expanse, 11 mm.

Apterous viviparous female: On roots of Douglas fir. General color white with a dusky tinge; head, antennae and cauda dusky to nearly black. Wherever they have been feeding, the bark and earth have a bluish tinge. Head with four pairs of wax plates, sometimes the center plate is absent and the two basal plates are merged into one long plate. Antennae and legs set with numerous short hairs. Fifth segment with one small sensoria at the distal end.

Measurements: Length of body, 2 mm.; width, 1.5 mm. Length of antennae by segments: I, 0.066 mm.; II, 0.11 mm.; III, 0.12 mm.; IV, 0.135 mm.; V, 0.2 mm.; VI and spur, 0.176 mm.

Fall migrant (Plate V, fig. 2): General appearance, wings smoky; head and thorax bluish black; abdomen bluish green, covered with a heavy coating of white waxy threads. Antennae and legs dusky. Antennae with six segments, the spur being but a thumb-like projection. The third segment with 21 to 24 transverse sensoria; fourth with 8 to 12; fifth with 6 to 11; sixth with 3 to 6. Abdomen spindle shaped and with a row of 7 or 8 nipple-like protuberances along each side. Cauda short and bluntly angled at the tip. Anal plate broad and slightly rounded.

Measurements: Length of body, 2.25 mm.; width, 0.9 mm.; wing expanse, 8.5 mm. Length of antennae by segments: I, 0.066 mm.; II, 0.09 mm.; III, 0.38 mm.; IV, 0.22 mm.; V, 0.242 mm.; VI, 0.176 mm.; spur, 0.045 mm.; total length, 1.219 mm.

Sexual forms: The sexual forms are minute, light brown and the only development which takes place after birth may be a single molt, as reported from other related species. Both sexes are without mouth parts and each female develops but a single egg. Copulation apparently takes place shortly after birth and both males and females live but a short time. The males are broader and shorter than the females and the body segments are more distinct. The antennae have fine hairs in both cases.

Measurements: Males—Length of body, 0.56 mm.; width, 0.31 mm.; antennae, 0.22 mm. Females—Length of body, 0.71 mm.; width, 0.242 mm.; antennae, 0.242 mm.

The eggs are light brown when first deposited and later turn brownish black.

II. THE APHIDIDAE INFESTING SAGE BRUSH (*ARTEMESIA SPP.*) IN OREGON

Nine species of aphids have heretofore been described as new from the various species of *Artemesia* in America. Of these at least seven are found in Oregon. Six additional species are here recorded and it is possible that two of these, *Microsiphum oregonensis* and *Aphis hermistonii*, may prove to be Western forms of *M. canadensis* Williams and *Aphis canae* Williams. A key to the Oregon species is included below:

- | | |
|---|---|
| I. Nectaries less than four times as long as wide. | II. |
| Nectaries more than four times as long as wide. | V. |
| II. Body with specialized setae. | III. |
| Body without specialized setae. | IV. |
| III. Specialized setae broadly fan-like at tip. Nectaries shorter than width. | |
| | Chaitophorus tridentatae new species |
| Specialized setae narrowly fan-like at tip. Nectaries twice as long as broad. | |
| | Microsiphum oregonensis new species |
| IV. Setae pointed at tip. Nectaries as broad as long. | |
| Color green. | Microsiphum canadensis (Williams) |
| Color red or brown. | Microsiphum artemesiae (Gillette) |
| V. Antennae shorter than the body. | VI. |
| Antennae longer than the body. | IX. |
| VI. Body with specialized setae (fan-like at tip). | VII. |
| Body without specialized setae (pointed at the tip). | VIII. |
| VII. Nectaries cylindrical and straight, mouth enlarged. | |
| | Aphis frigidae Oestlund |
| Nectaries curved and slightly clavate, held close to the body. | |
| | Aphis tridentatae new species |
| VIII. Color of body dark green. | |
| | Aphis hermistonii new species |
| Color of body shining wine red. | |
| | Aphis artemesicola Williams |
| Color of body brown. | |
| Third antennal segment with numerous small sensoria. | Aphis reticulata new species |
| Third antennal segment with less than ten large sensoria. | Aphis oregonensis new species |

IX. Body covered with specialized setae. (Fan-like at tip.)

Macrosiphum artemesicola Williams

Body covered with capitate setae.

Macrosiphum frigidae Oestlund

Body covered with pointed setae.

Macrosiphum ludovicianae Oestlund

Chaitophorus tridentatae new species (Plate VI, figs. 22 to 25.)

Found throughout eastern Oregon on *Artemesia tridentata*. This species is not always easy to locate on account of the similarity in color of the body to that of the plant. The entire body is covered with specialized setae which are fan shaped at the tip. These give the appearance of fine white hairs or powder. Most of the individuals are found in rows, one behind the other on the leaves. A good many are found in around the base of the leaf and flower stems.

Apterous viviparous female: General color, light green with more or less of a powdery appearance. Abdomen with a darker green line along the center. Antennae dusky at the tip and shading to light green at the base. Legs with tarsi black; remaining parts and the cauda dusky. Body covered with specialized setae which are broadly fan shaped at the apex. Nectaries not much more than pores and hardly distinguishable among the specialized setae. Antennae shorter than the body and without distinct tubercles. First antennal segment strongly gibbous and with two or three specialized setae, one of which is found at the apex of the segment. Second segment with one, third with four, fourth with two and fifth and sixth without setae. Legs have no specialized setae. Cauda slightly ensiform and not visible from above. Nectaries so short that shape and size cannot be definitely settled with material at hand.

Measurements: Length of body 1.38 mm.; width 0.67 mm. Length of antennal segments: III, 0.154 mm.; IV, 0.11 mm.; V, 0.135 mm.; VI, 0.11 mm.; spur, 0.154 mm.; length of cauda, 0.11 mm.

Alate viviparous female: Light green in color as in apterous form. Head and thorax light brown. Antennae black at the tip and shading to light green at the base. Legs light green with tips of the tibiae and the tarsi black. Cauda light green, nectaries invisible. Entire body covered with specialized setae as in the apterous form. Third antennal segment with 4 or 5 large sensoria, wings long and slender, venation normal. Cauda rounded and tapering at the tip.

Measurements: Length of body, 0.88 mm.; width, 0.30 mm. Length of antennal segments: III, 0.22 mm.; IV, 0.135 mm.; V, 0.176 mm.; VI, 0.135 mm.; spur, 22 mm. Length of cauda, 0.09 mm.; length of wing, 1.84 mm.; width, 0.71 mm.

Microsiphum canadensis (Williams) (Plate VI, figs. 1 to 7.)

Cryptosiphum canadensis (Williams).⁴

Except for a difference in color there is practically no difference between this species and *M. (Chaitophorus) artemesiae* Gillette. *M. oregonensis* differs from the latter in the specialized setae, so that there is a possibility that these species may be only different forms of the same species.

Apterous viviparous female: General color pale green. Antennae deep black at the tip and through segments 4 to 6; third segment dusky at the distal end and shading to light green at the base. Legs with the tarsi and tips of the tibiae and femora black, the other parts dusky. Body globular and broadly ovate from above; sparsely set with heavy blunt setae. Antennae as long as the body and on semi-distinct tubercles. Third segment with one large sensoria near the base (notes from type slide in U. S. Nat. Museum). Davis⁵ has figured this segment with 5 small sensoria; nectaries about as broad as long and tapering. Cauda very short and broad.

Measurements: Length of body, 1.9 mm.; width, 1.22 mm. Length of antennal segments: III, 0.4 mm.; IV, 0.4 mm.; V, 0.2 mm.; VI, 0.11 mm.; spur, 0.55 mm. Length of nectaries, 0.45 mm.; length of cauda, 0.45 mm.

Alate viviparous female: General color, head and thorax dusky or black, abdomen dark green?, nectaries and cauda dusky to black. Abdomen wide and rounded; tip widely rounded, and not pointed as in other species. Antennae as long as the body, black at the tips and lighter at the base. Antennal tubercles distinct but not extensive. Third antennal segment with from 2 to 4 large sensoria. Wings with normal venation but with veins slightly dusky. Nectaries short, slightly tapering and about as broad as long. Cauda triangular and acute at the tip.

Measurements: Length of body, 1.45 mm.; width, 0.9 mm. Length of antennal segments: III, 0.33 mm.; IV, 0.27 mm.; V, 0.27 mm.; VI, 0.135 mm.; spur, 0.622 mm. Length of nectaries; length of cauda 0.066 mm.; length of wing, 2.1 mm.; width, 0.84 mm.

Microsiphum artemesiae (Gillette) (Plate VI, figs. 8 to 16.)

Chaitophorus artemesiae Gillette.⁶

Collected on *Artemisia tridentata* at Salisbury, Oregon, July 26, 1914.

Apterous viviparous female: General color wine red and shining. In this case not brownish black as in the original description. Antennae black at the

⁴ "The Aphididae of Nebraska," University of Nebraska Studies, X, no. 2, p. 89.

⁵ Williams, "The Aphididae of Nebraska," a critical review, *ibid.*, XI, no. 3, July 1911, plate I.

⁶ Ent. News, XXII, p. 443, 1911.

tips, shading to opaque yellow at the base. Legs black except the basal portions of the tibiae and tarsi which are yellow. Nectaries and cauda concolorous with the body. Antennae as long or slightly longer than the body. Antennal tubercles semi-distinct. Third antennal segment with 1 or 2 large sensoria. Abdomen globose; nectaries as broad as wide and slightly tapering. Cauda short and triangular. Body covered with thick, pointed setae.

Measurements: Length of body, 1.75 mm.; width, 1 mm. Length of antennal segments: III, 0.51 mm.; IV, 0.38 mm.; V, 0.34 mm.; VI, 0.066 mm.; spur, 0.69 mm. Length of cauda and nectaries cannot be determined in specimens at hand.

Alate viviparous female: General color, head and thorax black with a reddish tinge. Abdomen shining brownish red. Antennae black at the tip, yellowish at the base. Legs, except base of tibiae and femora, black. Nectaries and cauda concolorous with the body. Wings with stigma and veins dusky; antennae reaching to the tip of the abdomen and the third segment with as many as 10 large sensoria, although Gillette only gives 4. The number apparently varies considerably, since I have found some specimens sent me by Mr. L. C. Bragg with six sensoria.

Measurements: Length of body, 1.44 mm.; width, 0.84 mm. Length of antennal segments: III, 0.51 mm.; IV, 0.38 mm.; V, 0.35 mm.; VI, 0.135 mm.; spur, 0.67 mm. Length of nectaries ?; length of cauda 0.066 mm.; length of wings, 2.58 mm.; width, 1 mm.

Microsiphum oregonensis new species? (Plate VI, figs. 17 to 21.)

Found on *Artemisia tridentata* at Salisbury, Oregon, July 26, 1914. That two species of such similar and unusual characters should exist on the same host in the same locality is more or less open to question, but the present species is questionably described as new on the fact that the setae of the individuals here included are entirely different from those of the preceding species, and while the nectaries are more or less similar there is still a distinct difference. The alate form has not been taken.

Apterous viviparous female: General color light wine red, with a more or less shining or metallic appearance. Antennae and legs dusky red except the basal half of the former and the tibiae of the latter. Body globose, oval from above, and sparsely set with long curved specialized setae each of which bears a flat fan-shaped tip. Antennae as long as the body. Antennal tubercles semi-distinct. Third segment with a single large sensoria near the base. First, second and third segments with spines similar to those on the body. On the third segment these are all on one side. Nectaries twice as long as broad and slightly tapering. Cauda short, broad and blunt.

Measurements: Length of body, 1.66 mm.; width, 0.88 mm. Length of antennal segments: III, 0.31 mm.; IV, 0.3 mm.; V, 0.27 mm.; VI, 0.41 mm.; spur, 0.49 mm. Length of nectaries, 0.066 mm.; length of cauda, 0.066 mm.

Aphis reticulata new species (Plate VII, figs. 1 to 7.)

On *Artemisia tridentata*, Klamath Falls, Oregon, July 9, 1914, and in company with *M. frigidae* Oestlund.

Apterous viviparous female: General color brown. Antennae black at the tip and shading to dusky at the base of the third segment. Segments one and two brownish opaque. Legs dark brown except at the base of the femora; nectaries and cauda dark brown to black. The important character of this species is the reticulation found over the entire body. The structure of the outer sheath of the antennae is unusually different in that it seems to be made up of numerous small ridges which gives an additional opaqueness and after clearing they can hardly be seen through. Antennae not quite as long as the body and on slight tubercles. The nectaries slightly tapering and slightly curved inward, no reticulations are found at the tip. Thorax bears a single finger-like tubercle on each side and the abdomen with others, a large pair just back of the thorax. Cauda slightly more than half as long as the nectaries and tapering to a blunt rounded point.

Measurements: Length of body, 1.72 mm.; width, 0.88 mm. Length of antennal segments: III, 0.49 mm.; IV, 0.24 mm.; V, 0.2 mm.; VI, 0.11 mm.; spur, 0.33 mm. Length of nectaries, 0.49 mm.; length of cauda, 0.18 mm.

Alate viviparous female: General color of head, thorax, antennae and legs, black. Abdomen dark brown. Antennae reaching to the base of the nectaries, third segment with about 40 irregular, raised sensoria. Ocular tubercles unusually prominent. Prothorax with a single finger-like tubercle on each side. Abdomen with tubercle above base of hind pair of legs. Nectaries reaching beyond the tip of the cauda, cylindrical and tips slightly bent outward and downward. Cauda tapering, curved upward and blunt at the tip.

Measurements: Length of body, 1.5 mm.; width, 0.58 mm. Length of antennal segments: III, 0.4 mm.; IV, 0.2 mm.; V, 0.22 mm.; VI, 0.11 mm.; spur, 0.35 mm. Length of nectaries, 0.31 mm.; length of cauda, 0.154 mm.; length of wings, 3.1 mm.; width, 1.04 mm.

Aphis oregonensis new species (Plate VII, figs. 8 to 17.)

Collected at Klamath Falls, Oregon, July 8, 1913, on *Artemisia tridentata*.

A peculiar condition of the plant was found in connection with each colony of this species. In every instance the stem of the plant had been broken and bent over. There were indications present that some insect had almost eaten away the stem at that point.

Apterous viviparous female: General color, greyish brown tinged with wine red. Nectaries with the first four and the basal half of the fifth segments yellow, remaining parts black. Legs, except the tip of the tibiae and the tarsi, yellowish; rest black. Nectaries and cauda black. Antennae about one-half the length of the body. Prothorax with a single blunt tubercle. Abdomen

broadly oval, pointed at the tip and with a row of 4 or more blunt tubercles along the side of the abdomen. Nectaries slightly tapering and curved; cauda short, broad at the base and tapering to a rounded tip.

Measurements: Length of body, 1.71 mm.; width of body, 1.11 mm. Length of antennal segments; III, 0.242 mm.; IV, 0.22 mm.; V, 0.176 mm.; VI, 0.135 mm.; spur, 0.242 mm. Length of nectaries, 0.42 mm.; length of cauda, 0.09 mm.

Alate viviparous female: General color of head and thorax black; abdomen greyish brown tinged with wine red. Antennae dusky yellow at base, black at the tip. Legs with middle of tibiae and femora dusky yellow; remaining parts black. Nectaries dusky red; cauda yellowish at the base, black at the tip. Antennae reaching to the base of the nectaries, third segment with 4 or 5 large sensoria. Prothorax with a single finger-like tubercle at the base of each side. Just back of that and apparently between the prothorax and the mesathorax on each side is a larger and broader tubercle or hump. Abdomen with a number of large tubercles along the side, two of which are finger-like projections one on each side midway between the nectaries and the cauda. Wing venation normal, nectaries tapering, smaller at the base than at the tip and reaching to the base of the cauda. Cauda short and tapering, tip bluntly rounded. Caudal plate broad and slightly rounded.

Measurements: Length of body, 1.34 mm.; width, 0.67 mm. Length of antennal segments: III, 0.242 mm.; IV, 0.154 mm.; V, 0.154 mm.; VI, 0.11 mm.; spur, 0.176 mm. Length of nectaries, 0.198 mm.; length of cauda, 0.11 mm. Length of wing, 2.22 mm.; width, 0.33 mm.

Aphis hermistonii new species (Plate VII, figs. 18 to 25.)

First taken at Hermiston, Oregon, 1912; later taken at Klamath Falls and other points in eastern Oregon. Found on *Artemisia tridentata*.

Apterous viviparous female: General color dark green, body flecked with patches of whitish powder. Antennae dusky yellow at the base, black toward the tip. Legs, nectaries and cauda dusky to black. Antennae not quite reaching to the base of the nectaries. Third segment with one sensorium and this is lacking in a great many individuals. Prothorax with a single well developed finger-like tubercle on each side. Abdomen with four large tubercles, two on each side. The first two are found one on each side of the abdomen near the thorax. The other two are found half way between the nectaries and the base of the cauda. Nectaries cylindrical with the tip much broader than the nectary proper. Cauda short and tapering.

Measurements: Length of body, 1.35 mm.; width, 0.777 mm. Length of antennal segments: III, 0.176 mm.; IV, 0.154 mm.; V, 0.156 mm.; VI, 0.11 mm.; spur, 0.18 mm.; length of nectaries, 0.35 mm.; length of cauda, 0.66 mm.

Alate viviparous female: General color head and thorax black; abdomen dark green with scattered spots of white powder; antennae, legs, nectaries and cauda dusky or black with a greenish tinge. Antennae not quite reaching to the base of nectaries. Third segment with 4 or 5 large sensoria. Prothorax with tubercles as in the apterous form and abdomen with a single large

tubercle on each side just behind the metathorax. Nectaries thicker at the base and at the tip than in the middle. Flange at the tip broadest part of nectaries. Cauda short, tapering and turned upward.

Measurements: Length of body, 1.2 mm.; width, 0.5 mm. Length of antennal segments: III, 0.198 mm.; IV, 0.11 mm.; V, 0.135 mm.; VI, 0.01 mm.; spur, 0.176 mm. Length of nectaries, 1.54 mm.; length of cauda, 0.05 mm.; length of wing, 1.62 mm.; width, 0.67 mm.

Aphis tridentatae new species (Plate VII, figs. 26 to 30.)

Found in company with *M. artemesiae* Boyer and *Ch. tridentatae* during May and June.

This species resembles *Ch. tridentatae* on the plants and the only distinction is the wider body and pinkish color of some individuals. Under the microscope the spines are found to be different and the presence of well developed nectaries readily separates this species from the other. There is no present genus into which this species can be placed so it is deemed best to designate it as an *Aphis* for the time being.

Apterous viviparous female: General color light pink or white, covered with numerous white fan-like specialized setae. Antennae black at the tip shading to dusky at the base; legs dusky at the tip of the femora and tibiae and the tarsi black. Head slightly convex, abdomen obovate, caudal end broadly rounded, cauda not apparent from above, very short and rounded. Antennae slightly longer than one-half the body and antennal tubercles present as ridges. Antennae without specialized setae. Legs sparsely set with setae like those on the body but not quite so heavy. Eyes hardly tuberculate. Nectaries curved and clavate with the tip cut obliquely. In many individuals the nectaries cling so closely to the body that they cannot be seen.

Measurements: Length of body, 1.54 mm.; width, 0.8 mm. Length of antennal segments: III, 0.14 mm.; IV, 0.135 mm.; V, 0.135 mm.; VI, 0.11 mm.; spur, 0.22 mm. Length of nectaries, 0.22 mm.; length of cauda, 0.45 mm.; length of specialized setae, 0.045 mm.

Alate viviparous female: General color pink or light green with light brown head and thorax. Antennae black at the tip and shading to light or dusky green at the base. Legs with femora light, tibiae dusky and tarsi black. Cauda light green. The spines are not nearly as numerous as in the apterous forms but they are sparsely found over the entire body and on the legs. Those on the legs are much finer than those on the body. Antennae normally nearly as long as the body and rather slender. Third segment with 4 round sensoria placed as in drawing. Wings long and slender, venation normal. Nectaries as in the apterous form. Cauda almost cylindrical and extending slightly beyond the tip of the abdomen.

Measurements: Length of body, 1 mm.; width, 0.35 mm. Length of antennal segments: III, 0.2 mm.; IV, 0.176 mm.; V, 0.151 mm.; VI, 0.09 mm.; spur,

0.27 mm. Length of nectaries, 0.22 mm.; length of cauda, 0.066 mm.; length of wing, 2.22 mm.; width, 0.67 mm.

Aphis frigidæ Oestlund ⁷ (Plate VIII, figs. 20 to 24.)

Found in company with *M. frigidæ* Oestlund on *Artemisia tridentata* throughout the eastern part of Oregon.

General color dark brown with a greenish tinge which is not at first evident on account of a general light colored appearance produced by a coating of fine white powder. In the original description of this species Oestlund speaks of "a rather thick pubescence of fine and short hairs" which I have been unable to discover. The entire body is, however, covered with long curved hairs having flared tips. Antennæ black except at the base of the third and the first and second segments. Legs, nectaries and cauda dusky to black. The antennæ are as long as the body and are not mounted on antennal tubercles. Head nearly straight in front, eyes black and with ocellus weak or entirely wanting. Abdomen oval and round and curved with numerous light spots which are the tubercles from which the hairs originate. The nectaries form one of the most important specific characters of this species. They are cylindrical throughout and the tip is widened out to twice the width of the main part. Cauda short and rounded at the tip.

Measurements: Length of body, 1.6 mm.; width, 0.78 mm.; length of antennal segments: III, 0.25 mm.; IV, 0.23 mm.; V, 0.22 mm.; VI, 0.11 mm.; spur, 0.42 mm. Length of nectaries, 0.42 mm.; length of cauda, 0.12 mm.

Aphis artemesicola Williams ⁸ (Plate VIII, figs. 16 to 19.)

What is believed to be this species was taken on *Artemisia tridentata* in company with *M. canadensis* Williams at Salisbury, Oregon, July 26, 1914. Only the apterous forms were taken but the specimens agree fairly well with Williams' description. The number of sensoria on the third antennal segment do not, however, correspond with those shown by Davis in his critical review of Williams' species.⁹

General color shining wine red; antennæ about two-thirds the length of the body. Antennal segments one, two and the greater part of three dusky yellow; remaining parts deep black. Legs black except at base of femora and the basal half of the tibiae. Nectaries black; cauda black at tip, dusky red toward base. Antennæ with from 2 to 8 sensoria on the third segments, mostly 2 to 4. Nectaries slightly tapering and each one with about four hairs; tip flanged. Cauda short and broad at the base, and pointed at the end. Body with pointed hairs.

⁷ Fourteenth Annual Rept. Geol. and Nat. Hist. Surv. Minn., 1886, p. 46.

⁸ "The Aphididae of Nebraska," University of Nebraska Studies, X, no. 2, p. 37.

⁹ Loc. cit.

Measurements: Length of body, 1.21 mm.; width, 1.154 mm. Length of antennal segments: III, 0.44 mm.; IV, 0.33 mm.; V, 0.27 mm.; VI, 0.135 mm.; spur, 0.49 mm. Length of nectaries, 0.15 mm.; length of cauda, 0.11 mm.

Macrosiphum artemesicola Williams¹⁰ (Plate VIII, figs. 11 to 15.)

On *Artemisia vulgaris* at Corvallis, Oregon, July 2, 1911.

General color pale green and appearing as if covered with minute particles of fine white powder. This appearance is in reality due to numerous capitate hairs which cover the entire body but are not found on the appendages. This species is a very active one and may be found in company with *M. ludoviciana* on the above host on the stems and leaves, mostly on the former.

Apterous viviparous female: General color light green and almost identical with that of the food plant. Antennae black except the first and second and basal parts of the third segments. Legs dusky to black except the basal part of the tibiae and femora. Nectaries black. Cauda dusky. Antennae long and slender and reaching beyond the nectaries and cauda. Each antennal tubercle with a single capitate hair at its apex. First antennal segment strongly gibbous on the inner side. Third segment with two visible sensoria near the base, fifth with one near the distal end and sixth with the usual number at the base of the spur. The entire body is thickly set with toadstool-like setae of which there appears to be two forms. They are in reality about the same size and shape except that those on the head and at the base of the cauda have a longer stem than those on the rest of the body. The antennae are very sparsely set with fine short hairs. The same is true of the femora and while there are a greater number on the tibiae they are not as numerous as in the previous species. The hairs on the cauda and caudal plate are rather sparse and are longer than those on the legs and antennae. Nectaries slender and slightly tapering. Cauda ensiform and rounded at the tip. The outer surface of the latter seems to be made up of fine short pointed scales.

Measurements: Length of body, 1.73 mm.; width, 0.88 mm. Length of antennal segments: III, 0.58 mm.; IV, 0.49 mm.; V, 0.49 mm.; VI, 0.11 mm.; spur, 0.75 mm. Length of nectaries, 0.44 mm.; length of cauda, 0.154 mm.

Alate viviparous female: General color of head and thorax dusky brown or black; abdomen similar in appearance to that of apterous form. Antennae black at the tip shading to light green at the base. Legs dusky green at distal end of tibiae and femora, lighter at base; tarsi black. Nectaries and cauda dusky to black. Antennae longer than the body. Antennal tubercles strong and each with three capitate hairs, center of forehead with two. First antennal segment strongly gibbous and without hairs or bristles. Third segment with about 14 round sensoria on the outer side of the segment, fourth apparently with none, the fifth with one and the sixth normal. Wings hyaline but with dark veins. Nectaries more slender than in the apterous form and thicker at the base and tip than in the middle. Cauda tapering and with a broadly rounded tip.

¹⁰ "The Aphididae of Nebraska," University of Nebraska Studies, X, no. 2, p. 73.

Measurements: Length of body, 2.11 mm.; width, 0.95 mm. Length of antennal segments: III, 0.86 mm.; IV, 0.75 mm.; V, 0.73 mm.; VI, 0.154 mm.; spur, .122 mm. Length of nectaries, 0.644 mm.; length of cauda, 0.154 mm.; length of wing, 3.11 mm.; width, 1.11 mm.

Macrosiphum artemesiae Boyer¹¹ (Plate VIII, figs. 6 to 10.)

Siphonaphora frigidae Oestlund,¹²

Nectarophora artemesiae Cowen,¹³

Nectarophora coweni Hunter.¹⁴

This species is found in all sections of Oregon where *Artemesia tridentata* grows. It has been collected in a very isolated patch of this plant on top of Grays Peak, Grant County, Oregon, elevation about 7000 feet. It apparently does not occur in the Willamette valley. Two forms of this species are generally found, one a dark shining green and the other a light moss green. Both forms are found together on the same plant, and in late July colonies of the lighter form may be found separate from the others. The following description is made from the dark form:

Apterous viviparous female: General color dark metallic green; legs and antennal black except the basal parts of the femora, and the first, second and a part of the third antennal segments. Eyes, nectaries and cauda black. Antennae longer than the body, third segment with from six to nine irregular round sensoria. Nectaries long, stout, tapering, and reaching beyond the tip of the cauda. Each nectary with about four capitate setae. Cauda long, heavy, broadly pointed and ensiform. Nectaries reticulated for a very short distance back of the tip. The chief character of this species is the capitate hairs which are found sparsely over the body.

Measurements: Length of body, 2 mm.; width, at widest part of abdomen, 1.25 mm. Length of antennal segments: III, 0.74 mm.; IV, 0.6 mm.; V, 0.5 mm.; VI, 0.154 mm.; spur, 0.8 mm. Length of nectaries, 0.73 mm.; length of cauda, 0.30 mm.

Alate viviparous female: General color, head and thorax shining black. Abdomen shining dark green. Antennae except base of third segment and legs except base of femora black; eyes, nectaries and cauda also black. Antennae longer than the body and on strong gibbous tubercles. Third segment with 11 to 15 visible round irregular sized sensoria, fourth with about seven and fifth and sixth with usual number. It is impossible to make out all of the sensoria on the third and fourth segments without clearing. Wing venation

¹¹ Ann. Soc. Ent. France, X, p. 162, 1841.

¹² Fourteenth Ann. Rept. Geol. and Nat. Hist. Survey Minn., 1886, p. 20.

¹³ Colo. Agr. Exp. Sta. Bull. 31, Tec. Ser. 1, p. 123, 1895 (Mr. L. C. Bragg writes me that Cowen's species is the same as that of Oestlund.)

¹⁴ Iowa Ex. Sta. Bull. 60, 1901, p. 114, A new name for *N. artemesiae* Cowen, which is preoccupied.

normal. Nectaries thick, long and almost cylindrical but with a slight taper. They reach to about the tip of the cauda, which is similar in shape to that of the apterous form.

Measurements: Length of body, 2 mm.; width, 0.9 mm. Length of antennal segments: III, 0.75 mm.; IV, 0.51 mm.; V, 0.47 mm.; VI, 0.154 mm.; spur, 0.75 mm. Length of nectaries, 0.52 mm.; length of cauda, 0.27 mm.; length of wing, 4 mm.; width, 1.34 mm.

Macrosiphum ludovicianae Oestlund (Plate VIII, figs. 1 to 5.)

Collected at Corvallis, Oregon, July 2, 1911. On *Artemisia vulgaris* and on the same plant at Salisbury, Oregon, July 26, 1914. A very large greyish green species feeding mostly on the stems.

Apterous viviparous female: General color pale green, entire body covered with a fine white powder, eyes reddish. Antennae longer than the body and black except the first and second segments and the basal half of the third which are dusky. Legs black except the basal part of the femora. Nectaries black and cauda yellow. Third segment of antennae with 9 to 12 visible irregular sensoria, which are more or less roundish in shape. Nectaries and cauda as in the alate form.

Measurements: Length of body, 2.5 mm.; width, 1.1 mm. Length of antennal segments: III, 1.11 mm.; IV, 1.07 mm.; V, 0.86 mm.; VI, 0.3 mm.; spur, 1.25 mm. Length of nectaries, 0.86 mm.; length of cauda, 0.53 mm.

Alate viviparous female: General color light green; abdomen and legs covered with a white powder which gives them about the color of the plants upon which they are found. Eyes red. Antennae deep black except the two basal segments and a part of the third. Legs dusky to black except the basal one-third of the femora which is lighter. Nectaries black, cauda yellowish green. Antennae longer than the body and on strong tubercles. Third segment with about 55 visible sensoria, variable in size and oval to round in shape; the fourth segment apparently has none and the fifth bears one large one near the distal end. Sixth with the usual sensoria at the base of the spur. Nectaries somewhat slender and tapering; thickest at the base and flanged at the tip; the distal half distinctly different in appearance from the basal half on account of the reticulated surface. Cauda nearly as long as the nectaries and shaped like a spear head with the broadest part in the middle.

Measurements: Length of body, 3 mm.; width, 1 mm. Length of antennal segments: III, 1.22 mm.; IV, 1.08 mm.; V, 0.9 mm.; VI, 0.3 mm.; spur, 1.24 mm. Length of wing, 4 mm.; width at widest part, 1.31 mm. Length of nectaries, 0.71 mm.; length of cauda, 0.51 mm.

III. NEW SPECIES OF APHIDS

Amphorophora subterrans new species (Plate IX, figs. 1 to 4.)

Collected on roots of *Dactylis glomerata* Linn. at Corvallis, Oregon, April 6, 1912. Very abundant 6 to 8 inches below the surface of the ground in loose soil. Apterous, alate and pupae forms found.

Apterous viviparous female: General color dark green with a brownish tinge. Antennae black, eyes dark red. Legs yellow except at the tips of femora and tibiae and tarsi, which parts are black. Nectaries and cauda black. Body sparsely set with short hairs. Antennae reaching beyond the tip of the cauda, third segment with two circular sensoria near the base. Nectaries reaching to the base of the cauda and swollen in the middle. Cauda tapering and blunt at the tip.

Measurements: Length of body, 1.95 mm.; width, 1 mm. Length of antennal segments: III, 0.56 mm.; IV, 0.42 mm.; V, 0.3 mm.; VI, 0.135 mm.; spur, 0.67 mm. Length of nectaries, 0.46 mm.; length of cauda, 0.154 mm.

Alate viviparous female: General color head and thorax dark green or black; abdomen moss green with a dorsal dark green spot which is slightly narrower behind. Antennae black; legs dusky or black except femora, which have the basal part dusky yellow. Nectaries black; cauda black at the tip. Antennae longer than the body and on distinct antennal tubercles, third segment with 8 to 11 large circular sensoria. In some species an occasional small sensorium may be found adjacent to one of the larger ones. Body, antennae and femora sparsely set with short hairs. A distinguishing characteristic of this species is found in the ocular tubercles which themselves bear two or three smaller tubercles. Wing venation normal. Nectaries as in the apterous forms and semi-annulated just back of the tip which is strongly flanged. Cauda ensiform and tapering to a blunt tip.

Measurements: Length of body, 1.9 mm.; width, 0.9 mm. Length of antennal segments: III, 0.53 mm.; IV, 0.42 mm.; V, 0.38 mm.; VI, 0.176 mm.; spur, 0.73 mm. Length of nectaries, 0.4 mm.; length of cauda, 0.16 mm.; length of wing, 3 mm.; width at widest part, 1.22 mm.

Macrosiphum mentzeliae new species (Plate IX, figs. 5 to 9.)

Collected on *Mentzelia* at Monclova, Mexico, Nov. 23, 1909. This aphid was sent to me by Mr. F. C. Bishopp of the U. S. Bureau of Entomology. The specimens obtained are in alcohol but from the general light color they must have been of a pale green color. The color markings are not necessary for the easy determination of this species, however, as the entire body, legs and antennae bear short curved, capitate hairs.

Apterous viviparous female: Antennae longer than the body, dark at the tips and rather slender. Third segment with two small sensoria. Abdomen

long and slender. Nectaries reaching beyond the tip of the abdomen and long and slender. Cauda long and unusually broad.

Measurements: Length of body, not including cauda, 1.8 mm.; width, 0.67 mm. Length of antennal segments: III, 0.5 mm.; IV, 0.48 mm.; V, 0.4 mm.; VI, 0.135 mm.; spur, 0.75 mm. Length of nectaries, 0.55 mm.; length of cauda, 0.31 mm.

Alate viviparous female: Antennae reaching beyond the tips of the nectaries, dark at the tips and the third segment with about 10 to 12 round sensoria. Nectaries long and slender and reaching beyond the tip of the cauda. Cauda as in the apterous form.

Measurements: Length of body, 2 mm.; width, 0.75 mm. Length of antennal segments: III, 0.6 mm.; IV, 0.48 mm.; V, 0.4 mm.; VI, 0.135 mm.; spur, 0.8 mm. Length of nectaries, 0.6 mm.; length of cauda, 0.3 mm.; length of wing, 3 mm.; width, 0.9 mm.

Aphis lithospermii new species (Plate IX, figs. 10 to 14.)

A very common species on *Lithospermum pilosum* Nuttall in the southeastern part of Oregon during June and July.

Apterous viviparous female: General color dark green with 4 or 5 black transverse bars on the forepart of the abdomen and one at the base of the nectaries; head black and thorax dusky. Antennae black except at the base, tibia black at the ends and light in the middle. Nectaries and cauda black. Body robust and broadly oval. Nectaries reaching to about one-third the length of the body. Prothorax with one large finger-like tubercle. Abdomen with two tubercles on each side. One pair is found not quite half way from the thorax to the nectaries and the other pair is found between the base of the cauda and the nectaries. Nectaries short, about the same length as the cauda and tapering. Cauda short and tapering to a bluntly rounded tip. Entire body with a sparse pruinose covering.

Measurements: Length of body, 2.1 mm.; width, 1.38 mm. Length of antennal segments: III, 0.3 mm.; IV, 0.134 mm.; V, 0.154 mm.; VI, 0.11 mm.; spur, 0.198 mm. Length of nectaries, 0.176 mm.; length of cauda, 0.176 mm.

Alate viviparous female: General color head and thorax black; abdomen green with three transverse black bands just in front of the base of the cauda. Antennae black except at the base, and legs black except the middle part of the tibiae. Body stout, antennae about half as long as the body; third segment with about 9 to 12 irregular sensoria, and the fourth with two on the distal half of the segment. Thorax apparently without tubercles. Abdomen with two pairs of tubercles as in the apterous form but it is necessary to have the specimen turned slightly sidewise in order to make them out. Nectaries short and tapering and about as long as the cauda, which is short, tapering and with a blunt, rounded tip.

Measurements: Length of body, 1.67 mm.; width, 0.84 mm. Length of antennal segments: III, 0.31 mm.; IV, 0.156 mm.; V, 0.135 mm.; VI, 0.135 mm.; spur, 0.242 mm. Length of nectaries, 0.151 mm.; length of cauda, 0.15 mm.; length of wing, 2.62 mm.; width, 0.95 mm.

Aphis chrysothamni new species (Plate IX, figs. 15 to 18.)

Collected at Salisbury, Oregon, during July, 1912 and 1914, on *Chrysothamnus lanceolatus* Gr. This aphid is very abundant on side hills along the canyons. General color green to red. The young lice are green and the mature forms are red.

Apterous viviparous female: General color: head dark wine red, prothorax a lighter red and segment corresponding to metathorax greyish green; abdomen light green, mottled with darker green and with a large dark green spot in the center of the dorsum; last two segments covered with a greyish powder. In other stages the entire body assumes a pinkish tinge. Other mature forms are wine red mottled with dark green. Antennae light colored at the base, darker toward the tip; nectaries and cauda black. Body broadly ovate. Antennae less than half as long as the body and apparently without tubercles; thoracic segments with two pairs of lateral tubercles, the front pair broad and rounded, the second pair more slender and thumb-like in shape. Abdomen with only one pair of apparent tubercles, which are rather short and are situated between the nectaries and the cauda. Nectaries short and slightly tapering. In some cases they appear very slightly constricted just back of the tip. Cauda very short and broadly pointed.

Measurements: Length of body, 2.35 mm.; width, 1.62 mm. Length of antennal segments: III, 0.33 mm.; IV, 0.242 mm.; V, 0.198 mm.; VI, 0.11 mm.; spur, 0.154 mm. Length of nectaries, 0.242 mm.; length of cauda, 0.1 mm.

Alate viviparous female: General color: antennae, head and thorax black; abdomen green mottled with darker green; legs black with tibiae dusky. Body elongate and broad for its length. Antennae about two-thirds as long as the body, the third segment with 4 to 6 large sensoria in more or less of a straight line with each other; fourth with 4 to 7 sensoria. Wings with veins hairy and dusky. Veins m^1 and m^2 form a fork rather shorter and smaller than usual. Nectaries short and cylindrical. Cauda short, and almost triangular, tip rather sharp.

Measurements: Length of body, 1.55 mm.; width, 0.8 mm. Length of antennal segments: III, 0.33 mm.; IV, 0.242 mm.; V, 0.22 mm.; VI, 0.135 mm.; spur 0.198 mm. Length of nectary, 0.242 mm.; length of cauda, 0.11 mm.; length of wing, 2.22 mm.; width, 0.8 mm.

Macrosiphum pteridis new species (Plate IX, figs. 19a to 19c.)

Found throughout western Oregon on the fronds of *Pteris aquilina* Linn. Very common but disappears almost entirely from open places during heat of summer. Can be found in shaded spots along hillsides at all times.

Apterous viviparous female: General color yellowish white; legs dusky white and antennae white except sixth segment and spur. Body long and medium slender; antennae exceedingly long and slender; nectaries long, slender and

tip curved outward as in *Myzus*. Cauda short and ensiform. Entire body with medium length capitate hairs.

Measurements: Length of body, 2.77 mm.; width, 1.22 mm. Length of antennal segments: III, 1.2 mm.; IV, 0.88 mm.; V, 0.73 mm.; VI, 0.154 mm.; spur, 1.2 mm. Length of nectaries, 1.2 mm.; length of cauda, 0.3 mm.

Alate viviparous female: General color green with the head and thorax orange brown. Antennae black except the first two segments, which are dusky green or brown. Legs with base of femora yellowish, nectaries dusky orange at the tip, green at the base. Cauda green. Antennae long and slender and third segment with from 20 to 26 regular round sensoria in straight alignment. Wing venation normal. Antennae long, slender and with the distal half strongly curved outward. Cauda short and ensiform. Entire body except cauda and nectaries set with short capitate hairs. Cauda and caudal plate with pointed hairs.

Measurements: Length of body, 2.5 mm.; width, 0.9 mm. Length of antennal segments: III, 1 mm.; IV, 0.84 mm.; V, 0.777 mm.; VI, 0.242 mm.; spur, 1.33 mm. Length of nectaries, 0.67 mm.; length of cauda, 0.27 mm.; length of wing, 4.4 mm.; width, 1.66 mm.

Lachnus laricifoliae new species (Plate X, figs. 9 to 14.)

Collected on *Larix occidentalis* in Baker and Grant Counties, Oregon. The apterous forms are rather easy to find but not exceedingly numerous, while the alate forms are scarcer and harder to find. They are for the most part found about the base of the needle clusters.

Apterous viviparous female: General color black with a covering of white powder and with a light streak down the center of the dorsum. The antennae are dusky yellow at the base and black toward the tip. The legs are black except the basal portions of the femora and the center of the tibiae, which are dusky yellow. Cauda black. Body broadly oval and elongate. Antennae reaching to the base of the middle pair of legs and beak reaching to base of hind pair. Nectaries of medium diameter at the base and narrowly tapering to a wide funnel-shaped mouth. Cauda short and broadly rounded at the tip. Entire body, legs, nectaries and antennae covered with hairs.

Measurements: Length of body, 4.23 mm.; width, 2.22 mm. Length of antennal segments: III, 0.73 mm.; IV, 0.27 mm.; V, 0.31 mm.; VI, 0.154 mm.; length of cauda, 0.154 mm.; width at base, 0.42 mm. Length of hind tibiae, 2.22 mm.; length of hind tarsus, 0.35 mm.; length of hind metatarsus, 0.13 mm.

Alate viviparous female: General color black covered with a white powder and with a light streak down the center of the abdomen. Antennae and legs the same as in the apterous form. Head and thorax shining black. Nectaries black, with a large white spot at the base of the nectaries and which does not become conspicuous until the specimens have been put in alcohol. Cauda as in the apterous form. Antennae reaching to the base of the wings and the third segment with from 8 to 11 regular small sensoria; fourth segment with

one or two near the distal end and fifth with two large ones near the distal end. Spur of sixth short and ending in a thick short spine. Wings normal and with the median vein distinct and with two branches. Abdomen with a row of six blunt tubercles on each side. Nectaries and cauda as in the apterous form. Entire body, antennae, legs and nectaries covered with hairs.

Measurements: Length of body, 4.78 mm.; width, 2.1 mm. Length of antennal segments: III, 0.69 mm.; IV, 0.27 mm.; V, 0.35 mm.; VI, 0.135 mm. Length of hind tibia, 3.22 mm.; hind tarsi, first segment, 0.135 mm.; second segment, 0.35 mm.; length of beak, 1.9 mm.; length of wing, 5.33 mm.; width, 2.55 mm.

Lachnus oregonensis new species (Plate X, figs. 1 to 8.)

Collected on *Pinus* sp., Fort Klamath, Oregon, July 6, 1914. Found only on the cones. Alate and apterous forms. Possibly this species extends its feeding to the shoots later in the season.

Apterous viviparous female: General color shining brown, with the dorsum dusky to black. (In balsam immediately after mounting, there appears to be a slight streak down the center of the back with a dark black band extending from the base of the abdomen to the cauda.) Antennae yellowish at the base and black toward the tip. Legs dusky yellow at the base and black toward the tips; cauda black, nectaries black. Body obovate, robust and set with numerous fine hairs. Antennae slender and reaching to the middle of the mesothoracic segment; fifth segment with one or two large sensoria. Legs and antennae set with fine hairs, rather more plentiful on tibiae than on the femora. Nectaries broad and slightly tapering toward the central tube which is flanged at the tip. Cauda broadly rounded. The beak reaches beyond the tip of the abdomen.

Measurements: Length of body, 3 mm.; width, 1.5 mm. Length of antennal segments: III, 0.35 mm.; IV, 0.135 mm.; V, 0.135 mm.; VI, and spur, 0.135 mm. Length of hind tibia, 1.84 mm.; length of hind tarsus, 0.35 mm.; length of hind metatarsus, 0.09 mm.

Alate viviparous female: General color dark brown to black; abdomen with the dorsum of each segment black. Antennae light at the base, shading to black at the tip. Legs dusky yellow at the base of the femora and tibia and black at the tips; tarsi black. Antennae reaching to the base of the wings, the third segment with about 3 to 6 irregular sized round sensoria of medium size; fourth with one or two large sensoria; fifth with two and the sixth with the usual large and small sensoria. Abdomen with a row of fine tubercles along each side and on a line below the nectaries. Nectaries broadly cone-shaped. The beak reaches to the tip of the abdomen or slightly beyond. Wing venation complete. Median vein entire but appearing as an outline.

Measurements: Length of body, 2.4 mm.; width, 1 mm. Length of antennal segments: III, 0.38 mm.; IV, 0.154 mm.; V, 0.2 mm.; VI and spur, 0.154 mm. Length of wing, 3.8 mm.; width, 1.22 mm.; length of hind tibia, 1.86 mm.; length of hind tarsus, 0.4 mm.; length of hind metatarsus, 0.09 mm.; length of beak, 2.58 mm.

Lachnus rubicundus new species (Plate XI, figs. 8 to 14.)

Found on *Juniperus occidentalis* along the dry ridges of eastern Oregon. Specimens not very abundant and would probably escape being seen if it were not for the ants running about over the infested twigs. Only two alate forms taken in a half day's search.

Apterous viviparous female: General color, when young, light brown or pink; later they become covered with powder except a thin streak down the center of the back. Along each side of the abdomen and dorsally placed may be found a row of black dots, one to each segment. The first and largest are found on the prothoracic segment, the others growing smaller toward the end of the body. Below these and on the side may be found still another row of dots. As the aphids grow larger the spots become hidden under a fine white or pinkish pruinose covering. This powder with the brown body of the insect gives a decided pinkish appearance. Other stages or forms are dark brown mottled with black.

The body is exceedingly robust and globose. The antennae reach to about the second pair of legs and both legs and antennae are set with fine short hairs. The third and fourth antennal segments appear to be without sensoria; the fifth and sixth segments bear one each. The nectaries are broad and rounded without much depth. The cauda is broadly rounded.

Measurements: Length of body 3.55 mm.; width, 2 mm. Length of antennal segments: III, 0.44 mm.; IV, 0.135 mm.; V, 0.22 mm.; VI, and spur, 0.135 mm. Length of hind tibia, 1.51 mm.; length of hind tarsus, 0.27 mm.; hind metatarsus, 0.09 mm.; length of beak, 1.74 mm.

Alate viviparous female: General color: head nearly black, thorax dark brown, abdomen light brown mottled with dark brown to black splotches, body more or less pruinose. Antennae and legs light at the base and dark toward the ends. The former are somewhat stout and reach to the base of the metathorax; the third segment bears 5 to 7 large sensoria (sometimes less); the fourth, one or two; and the fifth, one large one at the distal end. The wings are long and wide with the median vein three branched. The stigma is long and narrow. Beak slender and sharp, reaching to within a short distance of the base of the cauda. Nectaries broad, cone-shaped and of medium thickness. Cauda broadly rounded.

Measurements: Length of abdomen, 2.9 mm.; width, 1.45 mm. Length of antennal segments: III, 0.4 mm.; IV, 0.176 mm.; V, 0.23 mm.; VI and spur, 0.151 mm. Length of wing, 3.8 mm.; width, 1.3 mm.; length of hind tibia, 1.9 mm.; length of hind tarsus, 0.242 mm.; length of hind metatarsus, 0.09 mm.; length of beak, 1.9 mm.

Lachnus parvus new species (Plate XI, figs. 1 to 7.)

Collected at Washington, D. C., July 4, September 15 and October 21, 1909. This species is quite distinct from all others collected by myself in the vicinity of Washington in that it is

covered with very fine waxy threads, and was found in rows along the needles of *Pinus virginiana* and *Pinus rigida*. This species was taken while collecting with Prof. C. P. Gillette, who has already indicated the species in the *Journal of Economic Entomology*, II, p. 385, 1909. This is the smallest species of this group known to me.

General color beneath the waxy threads, brownish tinged with green. These waxy threads are also spread about over the needles causing them to appear as if covered with a bluish powder. No other color notes were taken.

Apterous viviparous female: Body more robust than that of the alate form, antennae reaching to the third pair of coxae and the beak reaching to the second pair. Beak broad and blunt at the tip. Legs and antennae with numerous long and slender hairs. Third and fourth antennal segments apparently without sensoria, fifth and sixth segments with one each. Nectaries small and cone-shaped with a slight inclination to bell-shaped. The opening rather large for the base. Cauda bluntly angled.

Measurements: Length of body, 1.7 mm.; width, 0.84 mm. Length of antennal segments: III, 0.32 mm.; IV, 0.135 mm.; V, 0.14 mm.; VI and spur, 0.12 mm. Length of hind tibia, 0.94 mm.; length of hind tarsus, 0.33 mm.; length of hind metatarsus, 0.066 mm. Length of beak, 0.44 mm.

Alate males and ovoviparous females taken the last of October.

Alate viviparous female: Body elongate and slender, antennae and legs medium slender and thickly covered with long slender hairs. Antennae reaching to the third pair of coxae and the beak reaching to the second pair; beak broad and blunt at the tip. The third antennal segment bears about eight small sensoria; the fourth two and the fifth a single large one near the distal end; sixth with the usual large one near the base of the antennal spur. Wings hyaline and the median vein but a very indistinct single piece as indicated in the accompanying figure. Nectaries small and more or less bell-shaped. The opening rather large for the base. Cauda bluntly angled.

Measurements: Length of body, 1.48 mm.; width, 0.6 mm. Length of antennal segments: III, 0.32 mm.; IV, 0.154 mm.; V, 0.176 mm.; VI and spur 0.154 mm. Length of wing, 2.5 mm.; length of hind tibia, 0.92 mm.; length of hind tarsus, 0.3 mm.; length of hind metatarsus, 0.066 mm.; length of beak, 0.49 mm.

The writer is making an attempt to prepare a contribution toward a monograph of the *Lachninae*, and would appreciate receiving material from all sections of the world. Specimens may be mounted on slides but specimens in 70% alcohol are preferred. In either case, include such color notes as are obtainable. If specimens are sent in alcohol, put a small amount of cotton in the vial and push down until the material is held firmly

against the bottom; otherwise the specimens may lose their appendages. Credit will be given in all cases.

Note.—In the June, 1914, number of the *Entomological News*, an aphid from sugar cane was described as new by myself. Mr. T. E. Holloway, of the U. S. Bureau of Entomology, should have received credit for collecting the specimens.

EXPLANATION OF PLATES

Plate V

Fig. 1.—*Prociophilus fraxini-dipetalae* Essig. Antenna and wings of spring migrant from ash.

Fig. 2.—*Prociophilus fraxini-dipetalae* Essig. Antenna and wings of fall migrant from Douglas fir.

Plate VI

Microsiphum canadensis Williams, alate viviparous female: fig. 1, antenna; fig. 2, third antennal segment (much enlarged); fig. 4, nectary (enlarged); fig. 5, cauda. Apterous viviparous female: fig. 3, third antennal segment (much enlarged); fig. 6, specialized setae on frons; figs. 7, setae on body.

Microsiphum artemisiae Gillette, alate viviparous female: fig. 8, antenna; fig. 9, third antennal segment (much enlarged), Colo. specimens; fig. 13, do., Oregon specimens; fig. 11, nectary; fig. 12, setae; fig. 15, frons; fig. 16, cauda. Apterous viviparous female: fig. 10, third antennal segment, Colorado specimens; fig. 14, do., Oregon specimens.

Microsiphum oregonensis new species?, apterous viviparous female: fig. 17, antenna; fig. 18, third segment (much enlarged); fig. 19, two views of body setae; fig. 20, frons; fig. 21, portion of abdomen showing nectaries and cauda.

Chaitophorus tridentatae new species, alate viviparous female: fig. 22, head with antenna and a diagrammatic sketch of the arrangement of the specialized setae; fig. 23, nectary; fig. 24, specialized seta (much enlarged); fig. 25, cauda.

Plate VII

Aphis reticulata new species, alate viviparous female: fig. 1, antenna; fig. 2, third antennal segment (much enlarged); fig. 5, nectary; fig. 6, cauda. Apterous viviparous female: fig. 3, prothoracic tubercle; fig. 4, nectary; fig. 7, reticulations on body.

Aphis oregonensis new species, alate viviparous female: fig. 8, antenna; fig. 9, third antennal segment (much enlarged); fig. 10, tubercles on abdomen between cauda and nectaries; fig. 12, cauda; fig. 14, prothoracic tubercle; fig. 16, nectary. Apterous viviparous female: fig. 11, abdominal tubercles between cauda and nectaries; fig. 13, cauda; fig. 15, prothoracic tubercle; fig. 17, nectary.

Aphis hermistonii new species, alate viviparous female: fig. 18, antenna; fig. 19, third antennal segment (much enlarged); fig. 20, prothoracic tubercles; fig. 21, nectary; fig. 23, cauda. Apterous viviparous female: fig. 22, nectary; fig. 24, cauda; fig. 25, tubercles along the side of the abdomen.

Aphis tridentatae new species, alate viviparous female: fig. 26, antenna; fig. 27, specialized seta; fig. 28, frons; fig. 29, cauda; fig. 30, nectary.

Plate VIII

Macrosiphum ludoviciana Oestlund, alate viviparous female: fig. 1, antenna; fig. 2, third antennal segment (much enlarged); fig. 4, nectary; fig. 5, cauda. Apterous viviparous female: fig. 3, third antennal segment (much enlarged).

Macrosiphum artemisiae Boyer, alate viviparous female: fig. 6, antenna; fig. 7, third antennal segment much enlarged and showing specialized setae; fig. 8, nectary; fig. 10, cauda. Apterous viviparous female: fig. 9, third antennal segment (much enlarged).

Macrosiphum artemesicola Williams, alate viviparous female: fig. 11, antenna; fig. 12, nectary; fig. 13, frons; fig. 14, specialized setae; fig. 15, cauda.

Aphis artemesicola Williams, apterous viviparous female: fig. 16, antenna; fig. 17, third antennal segment (much enlarged); fig. 18, nectary; fig. 19, cauda.

Aphis frigidae Oestlund, apterous viviparous female: fig. 20, antenna; fig. 21, nectary; fig. 22, frons; fig. 23, specialized seta; fig. 24, cauda.

Plate IX

Amphorophora subterranea new species, alate viviparous female: fig. 1, antenna; fig. 2, nectary; fig. 4, cauda. Apterous viviparous female: fig. 3, third antennal segment.

Macrosiphum mentzeliae new species, alate viviparous female: fig. 5, antenna; fig. 6, nectary; fig. 8, cauda; fig. 9, capitate hair. Apterous viviparous female: fig. 7, third antennal segment.

Aphis lithospermi new species, alate viviparous female: fig. 10, antenna; fig. 11, nectary; fig. 12, cauda; fig. 14, abdominal tubercles. Apterous viviparous female: fig. 13, nectary.

Aphis chrysothamni new species, alate viviparous female: fig. 15, antenna; fig. 16, nectary; fig. 17, cauda. Apterous viviparous female: fig. 18, nectary.

Macrosiphum pteridis new species, alate viviparous female: fig. 19a, antennae; fig. 19b, cauda; fig. 19c, nectary.

Plate X

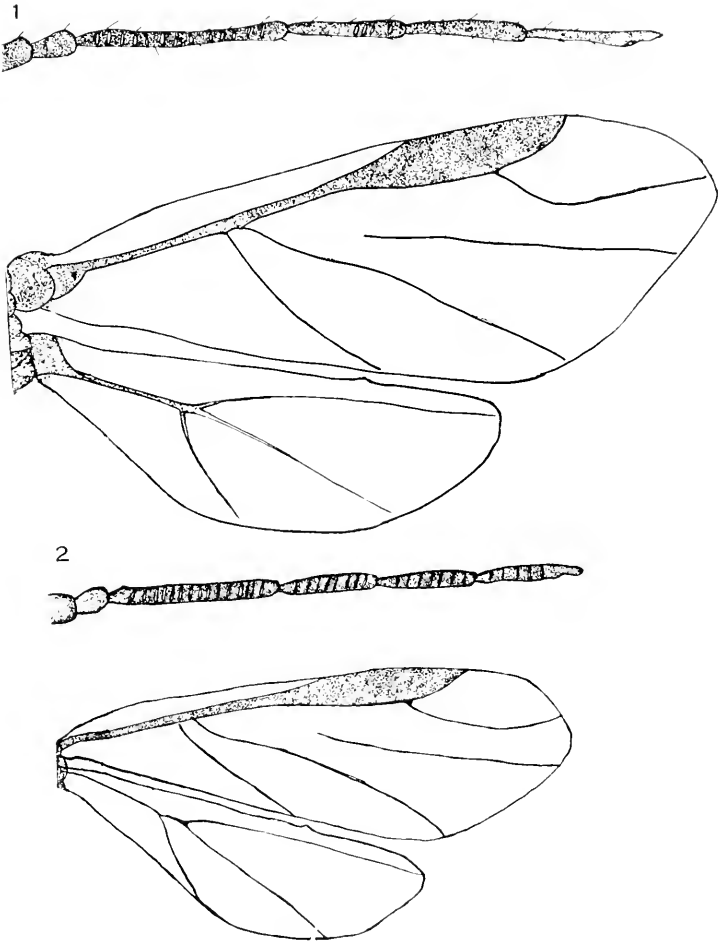
Lachnus oregonensis new species, alate viviparous female: fig. 1, wing; fig. 2, beak; fig. 3, hind leg; fig. 4, nectary; fig. 5, antenna; fig. 7, tip of abdomen; fig. 8, prothoracic segment. Apterous viviparous female: fig. 6, antenna.

Lachnus laricifoliae new species, alate viviparous female: fig. 9, wing; fig. 10, beak; fig. 11, hind leg; fig. 12, nectary; fig. 14, antenna. Apterous viviparous female: fig. 13, antenna.

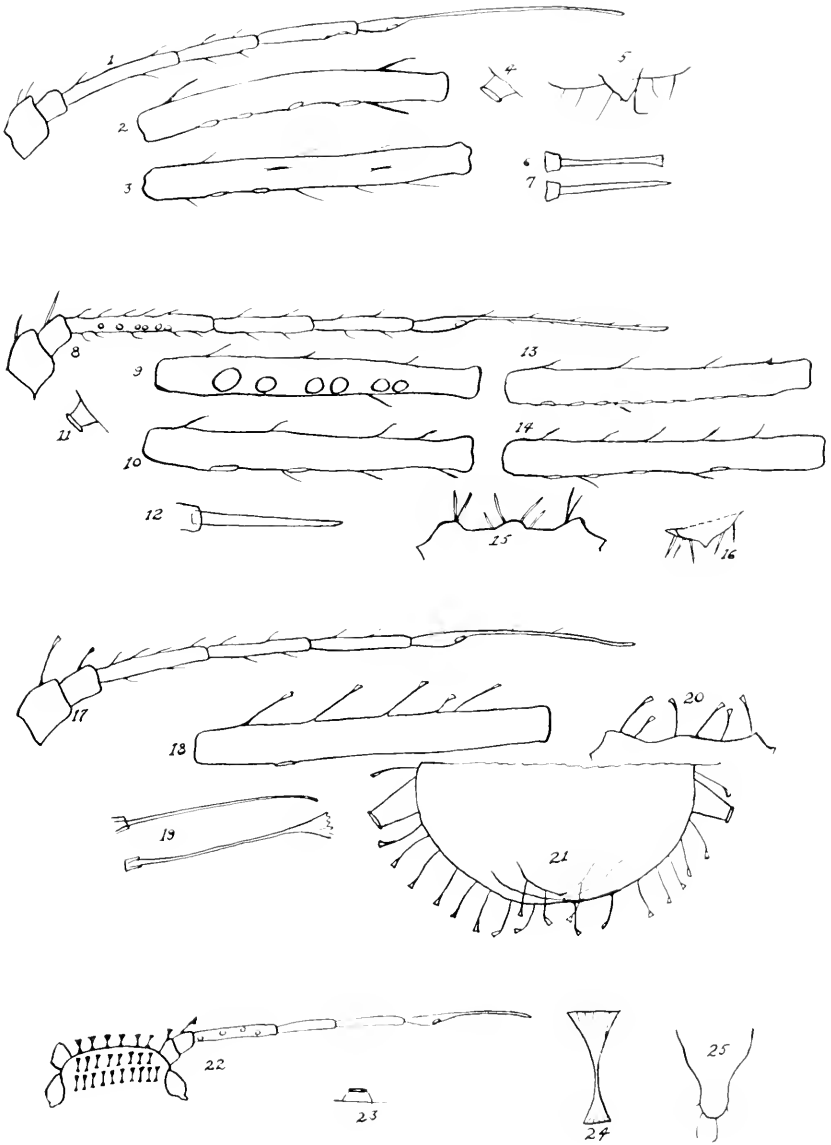
Plate XI

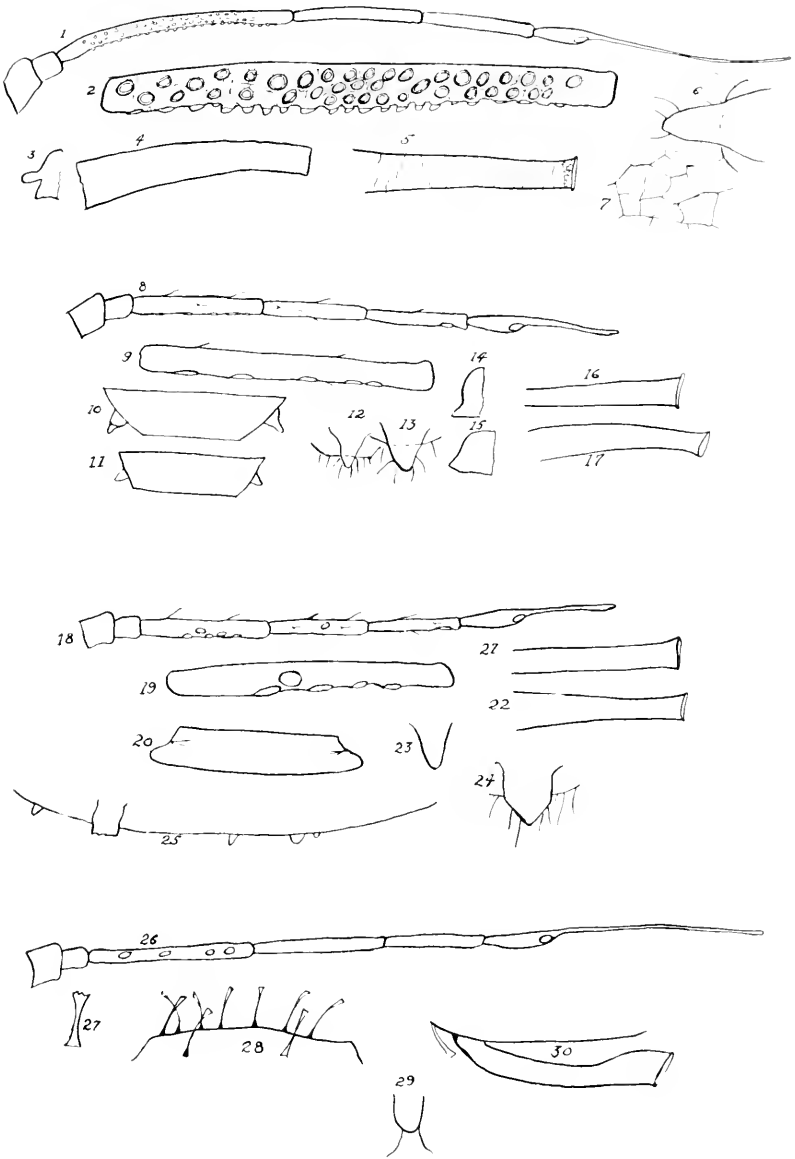
Lachnus parvus new species, alate viviparous female: fig. 1, wing; fig. 2, hind leg; fig. 3, antenna; fig. 5, nectary; fig. 6, cauda; fig. 7, beak. Apterous viviparous female: fig. 4, antenna.

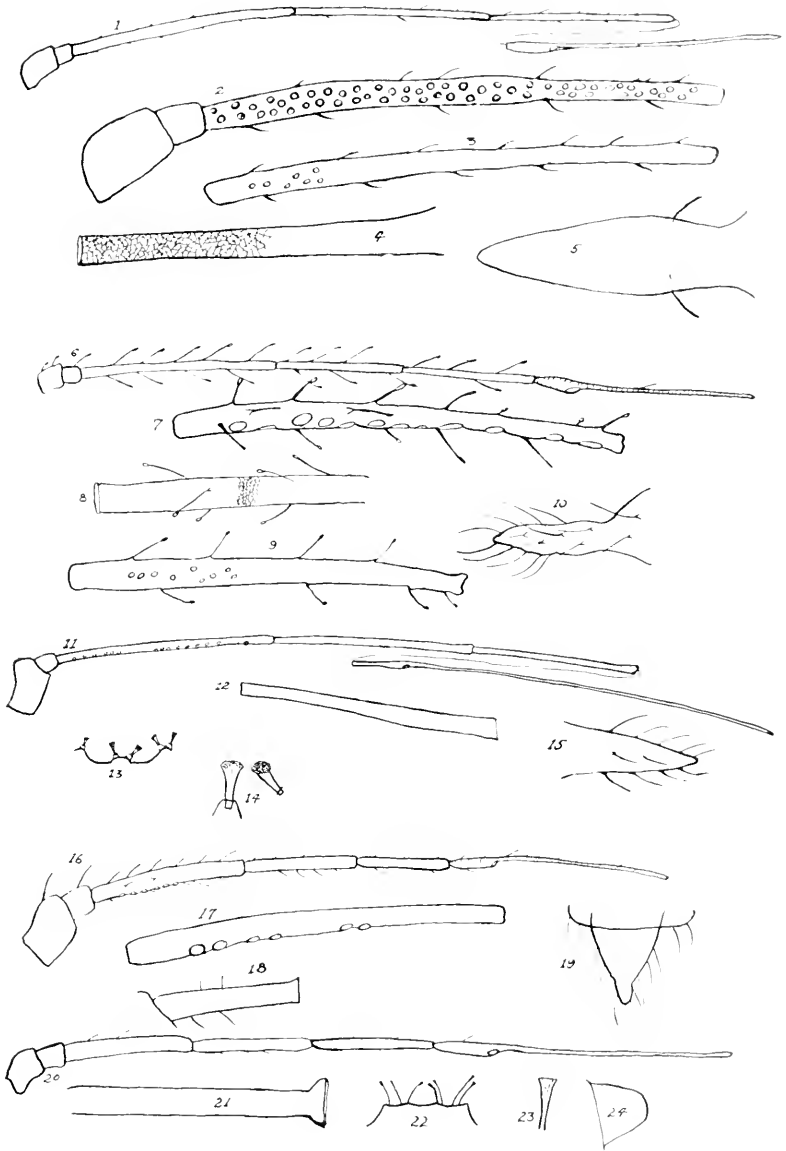
Lachnus rubicundus new species, alate viviparous female: fig. 8, wing; fig. 9, hind leg; fig. 10, antenna; fig. 12, nectary; fig. 13, cauda; fig. 14, beak. Apterous viviparous female: fig. 11, antenna.



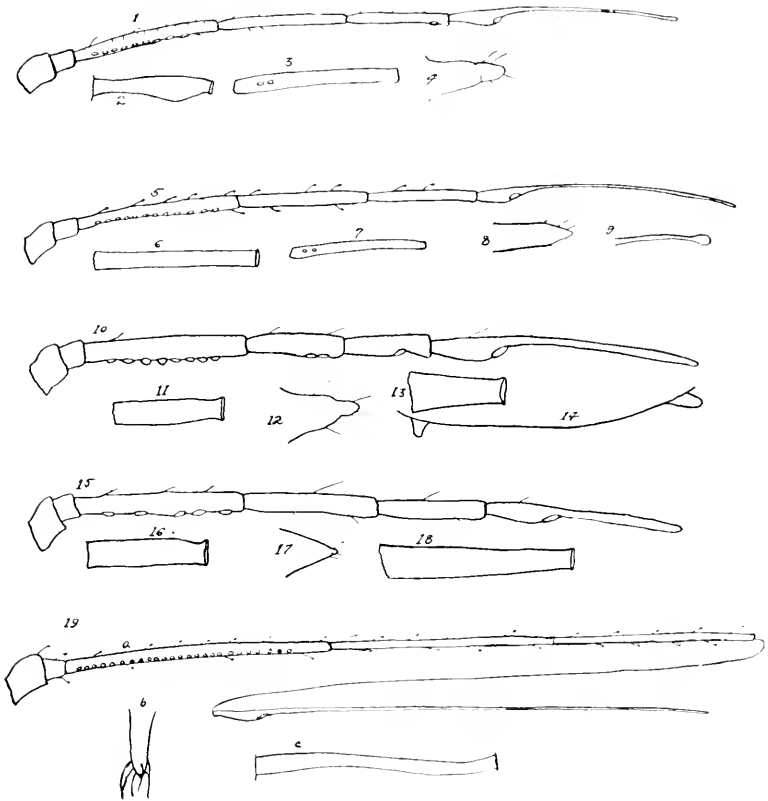
WILSON APHIDIDAE



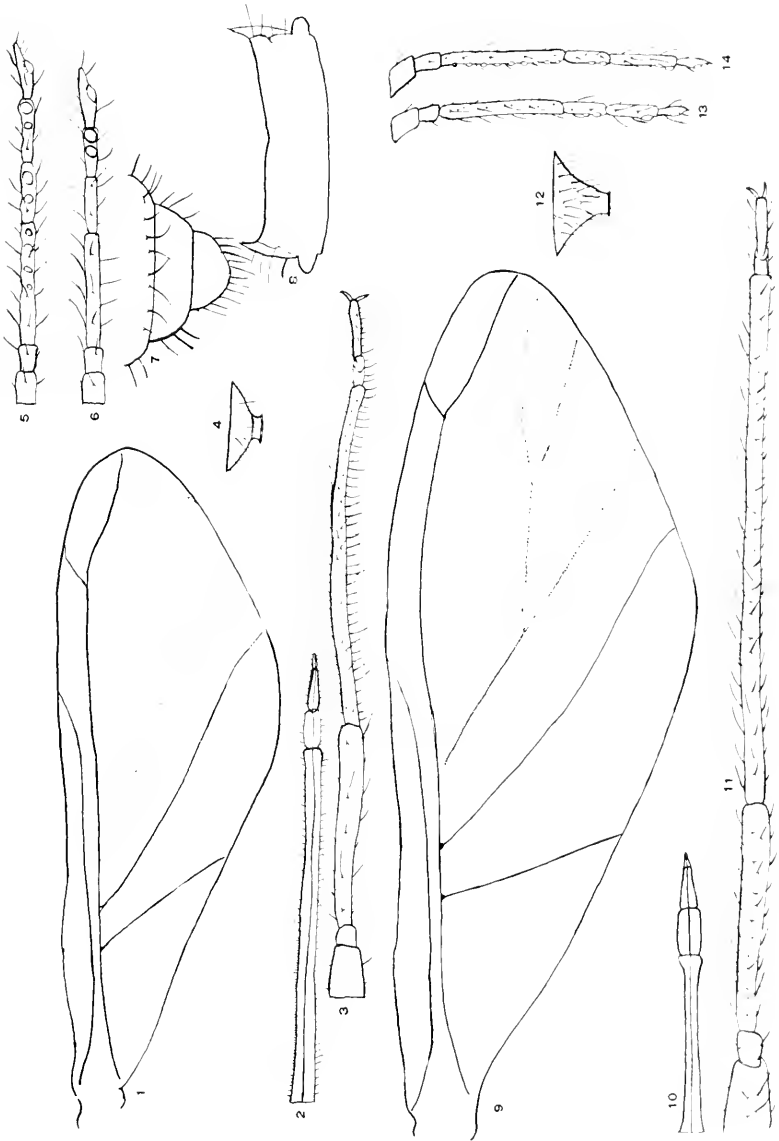




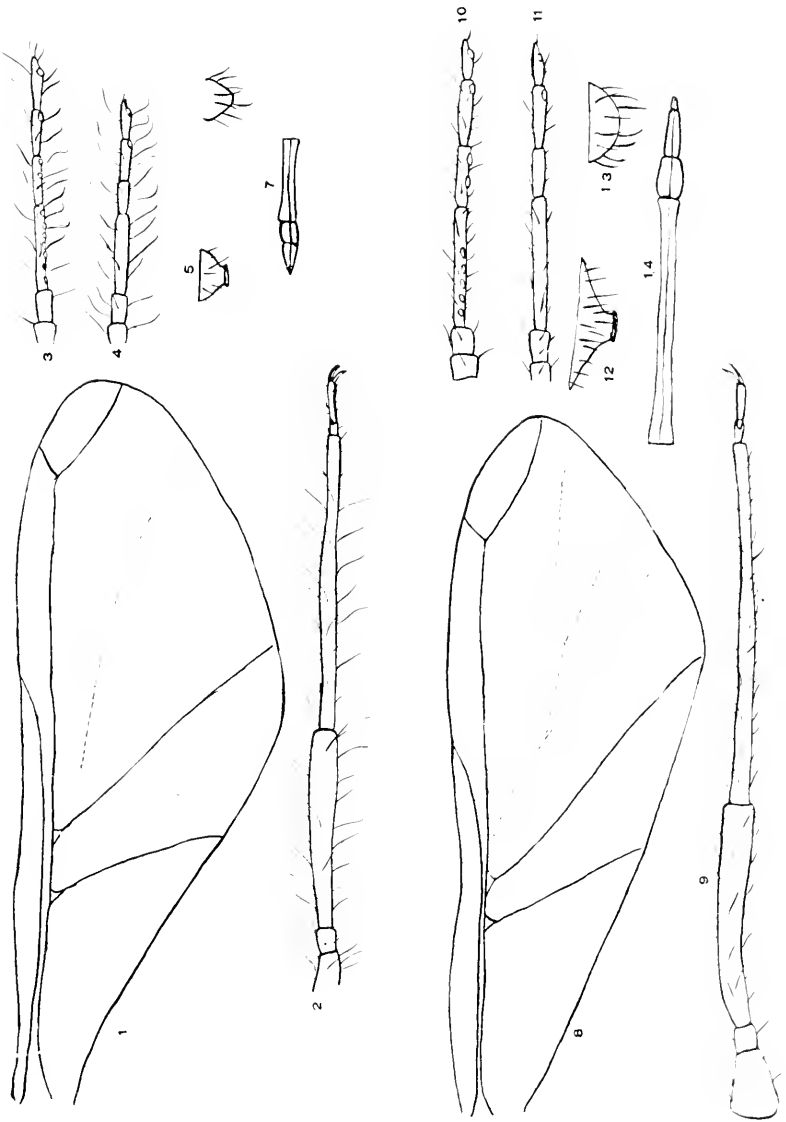
WILSON APHIDIDAE



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WILSON — APHIDIDAE

ON SOME GENERA OF THE PIMPLINE
ICHNEUMONIDAEBY J. H. MERRILL, PH.D.¹

INTRODUCTION

This paper is the result of three years' work done at the Massachusetts Agricultural College as a partial requirement for the degree of Doctor of Philosophy.

I wish to acknowledge my obligations to Dr. H. T. Fernald, under whose direction this work was carried on, to C. H. Fernald for his kindly suggestions, to Dr. G. C. Crampton for valuable advice and criticism, to W. S. Regan for the valuable assistance rendered me by securing specimens for study from the museums at Philadelphia, Washington, and New York, and making notes on the comparisons of these insects with their types, and to Dr. C. Gordon Hewitt for the loan of a large number of specimens.

Mr. F. A. Johnston began work on this group and had brought together copies of the descriptions of nearly all the insects treated here, when he accepted a position with the Bureau of Entomology, and the subject was given to me to continue.

Fourteen species and four genera are treated here. Of these, one genus and one species are described for the first time. Most of the other North American species are redescribed, wherever it was possible to obtain specimens from which to make the descriptions. The genus *Epirhyssa* has been abandoned, as it did not seem to have enough distinctive generic characteristics to separate it from *Rhyssa*. A new genus *Pseudorhyssa* has been established. Its transversely wrinkled mesonotum places it within the scope of the genera treated here; the entire sternal plates of its abdomen, however, separate it from the other genera. The type of this genus, *Pseudorhyssa sternata* is here described. The description of *Thalessa histrio*, an unlocated species, is also included.

Probably the largest and most valuable collection in this country of the insects treated here is at the Academy of Natural

¹Contribution from the Entomological Laboratory of the Massachusetts Agricultural College, Amherst, Mass.

Sciences in Philadelphia. Other collections from which material used in the preparation of this paper was borrowed, were those at the National Museum in Washington, the American Museum in New York, the Museum of the Boston Society of Natural History in Boston, the Children's Museum in Brooklyn and the collection of the Dominion Entomologist of Canada. The collections at the Museum of the Academy of Natural Sciences of Philadelphia and the National Museum in Washington are especially valuable, in that a number of type specimens are located there.

HISTORICAL

Linnaeus was the first to describe insects in this group. From his time down to the present, there have been numerous workers, but beyond synoptic tables to the genera, they have done nothing except to describe some of the species.

Holmgren² called the genus *Megarhyssa*, *Thalassa*, in 1859, but Adams had used this name in 1858 for a genus of mollusks. Ashmead³ proposed the name *Megarhyssa* on account of the name *Thalassa* being preoccupied in another branch of zoölogy. Dalla Torre¹ places "non Adams 1858" after the reference to Ashmead; this should have been placed after the reference to Holmgren.

The chief workers in this group have been Linnaeus, Fabricius, Kriechbaumer, Cameron, Cresson and Viereck. Both Cresson and Kriechbaumer not only described and named several new species but each established a new genus.

In the Proceedings of the United States National Museum for 1901, vol. xxiii, Ashmead divides the sub-family *Pimplinae* into tribes and establishes among others the tribe *Pimplini*. Up to this point his synoptic tables may be made use of, but when it is desired to determine the genera treated here it will be necessary to use a new key, because other generic values have been given to some characters, while the value of others has been lessened. The 62nd fascicle of the Genera Insectorum uses a key similar to the one used by Ashmead and the same criticism applies to it. In Cresson's Synopsis of the Hymen-

¹Ofters. Svensk. Vet.-Akad. Forh., xvi, 1859, p. 122.

²Canadian Entomologist, xxxii, 1900, p. 368.

³Catalogus Hymenopterorum, viii, p. 179.

optera, no division of the sub-family is attempted but the key is similar to the two preceding ones in the generic characters used.

The genus *Megarhyssa* is fairly constant in both color and structural characteristics, while the genus *Rhyssa* exhibits considerable variation in both. For that reason it would seem unsafe to describe a new species from a single specimen in *Rhyssa*.

EXTERNAL ANATOMY

The following description is taken mainly from *Megarhyssa lunator*. Certain modifications have been made to describe such differences as may occur in different species of the group treated here.

Head

The head is hypognathous, broader than long. Its general shape when viewed from in front is rounded-triangular. The compound eyes are large, extending from the top of the head to the clypeus. They are broad, together constituting one-half the width of the head when viewed from in front and when viewed from the side, at their widest part, forming a little more than half the width of the head. The inner margins of the compound eyes are slightly emarginated on its upper third, but nearly form two parallel lines with each other. The posterior margins are entire. The eyes are naked.

The clypeus occupies the lower portion of the front of the head and extends up to the lower borders of the compound eyes. The clypeus is narrow and elongated transversely. Laterally below the eyes it has fused with the cheeks. There is an impression reaching from the eyes to about the middle of the mandibles which suggests that it was a suture marking the division between the clypeus and the cheeks. If this is true, then the clypeus and cheeks together form the basal support of the mandibles. The lower border of the clypeus between the mandibles varies in outline, in different genera, from concave to convex. This fact is made use of in the determination of genera.

The frons, vertex, occiput and upper ends of the genae are fused, but the occiput and genae are fused dorsally, while laterally they are separated by a suture, and ventrally by a ridge. The occiput may be considered as that portion of the back of the head which is nearly vertical. It is concave from side to side, and the prothorax attaches at about its center.

The lack of definite sutures separating the plates of the head, necessitates the establishment of artificial boundaries. The vertex will be considered as extending from a line drawn through the posterior ocelli, back to a line from the ends of the sutures separating the genae from the occiput. The lateral limits of the vertex can be definitely fixed, but will be considered as extending to the compound eyes.

The portion of the head behind the compound eyes, extending from the vertex to the clypeus and back to the occiput, will be considered as the genae. The greatest width of the genae is at the lower border of the compound eyes. They gradually become narrower towards the top of the head.

The labrum is attached to the clypeus between the front borders of the mandibles. Being attached to the lower and inner side of the clypeus, it leaves the anterior borders of the latter clearly defined. The labrum bears a thick row of long spines on its outer edge.

The mandibles are situated on either side of the labrum. They are broad at the base, taper gradually toward the apex and the tip is slightly incurved. They have two teeth, the anterior one being blunt, while the posterior one is produced to a point. The maxillae lie behind the mandibles and each has a five-segmented palpus. The labium is so well concealed by the maxillae that it was impossible to separate it for careful study in the time at my disposal.

The antennae are filiform, long, slender and composed of about forty segments. They are covered by a large number of minute spines. The main portion of the scape is bluntly spindle-shaped when viewed from the mid line of the body, or from somewhat below the point of attachment. From this angle, the fact that the upper, outer side of this spindle has quite a deep, oval excavation from which the pedicel arises, is not perceptible. At its widest part, the scape is about twice as wide as the other segments. The bulb below the constriction enlarges so that its outline is triangular. The first segment of the antenna is globular and very much differentiated from the others. It is broader than long and about one-fifth the length of the second segment. The remaining segments are cylindrical and a gradual decrease in size appears on the outer half of the antenna. The

last segment is nearly twice as long as the preceding segment and narrows rather suddenly towards the tip.

Thorax

The prothorax consists of four visible plates; the notum, two episterna, and a sternum. Each episternum (Eps.₁) at its anterior end, articulates with the head by a hooked process which is the remains of the cervical sclerite. The episterna are separated ventrally by a median longitudinal suture. At the point of articulation with the head, each is quite slender, but posteriorly it enlarges and flattens out into a lobe which passes downward and backward below the pronotum and articulates at its posterior end with the procoxa (Cx.₁) of an anterior leg. As in most Hymenoptera, the episternum constitutes the greater part of the pleural portion of the prothorax, the epimeron being reduced to a strip so narrow that it is almost negligible, on the posterior border of the episternum and is hidden under the pronotum.

The pronotum (N.₁) is very broad laterally, its anterior face, being narrowed, forms a connection between the lateral plates. The sides are highly polished. The pronotum reaches the base of the tegulae (Tg.) and is produced downward to the episternum, coxae and sternum ventrally. The pronotal lobe (Pnl.) is distinct, though small, forming a peritremal sclerite overlapping the first thoracic spiracle (Tsp.). The sternum is overlapped and largely concealed by the approximated lobes of the episterna.

In the mesonotum, the prescutum, scutum and scutellum are plainly distinguishable. The postscutellum is small and for the most part is a phragma or internal process.

Near the upper, posterior corner of the pronotum, on each side and just below the anterior end of the attachment of the fore wing to the body is the first thoracic spiracle (Tsp.).

The prescutum (Psc.₂) is a triangular shaped plate, above the pronotum and separated from the scutum by two sutures which posteriorly converge and become transformed into flattened grooves. The front portion of the prescutum is nearly vertical and forms almost a right angle with its hinder portion, when viewed from the side.

Medially, the scutum (Sct.₂) extends to the raised median portion of the scutellum. Posteriorly the scutum is sunken

between the lateral plates of the scutellum (Scl.₂), so that its lateral margins are concealed. Both the prescutum and scutum are transversely rugose. The lateral margin of the prescutum is deflexed. The anterior portion of this deflexed margin is overlapped by the dorsal border of the pronotum. From the top of the pronotal lobe, just above the first thoracic spiracle, is a ridge extending to the anterior corner of the lateral lobe of the scutellum, behind which point, the margin of the scutum is concealed by this lobe, as already stated. Below and behind this ridge, the scutum bends abruptly and is somewhat hollowed, the lower margin of this portion of the plate extending backward until opposite the front end of the lateral lobe of the scutellum. The margin now turns upward and forms a suture with the front margin of the lateral lobe of the scutellum.

The scutellum (Scl.₂) consists of a median raised portion and two deflexed regions. From the front of the median portion of the scutellum a ridge runs downward on the side of the body toward the lower, hinder angle of the plate, and may be considered as marking the line between the median portion and the lateral lobe. The lateral lobe, as thus indicated, is approximately rectangular, its lower, hinder angle being somewhat drawn out and its lower border somewhat emarginated. The hinder margin of the median portion of the scutellum is practically a straight line, running obliquely backward on either side.

The fore wing has a much elongated attachment to the body, its humeral angle appearing just behind the pronotal lobe, and its internal margin near the lower, posterior corner of the lateral lobe of the scutellum. Beneath this wing attachment lies the upper margin of the mesoepisternum (Eps.₂).

The tegula (Tg.) which lies over the anterior portion of the base of the wing is a small chitinous plate, which appears to be attached medially to the front end of the hollowed portion of the scutum, just below the front edge of the ridge already described. Its real attachment and relation to the wing are considered under a separate heading elsewhere in this paper. Two tiny basal wing sclerites lie beneath the costal and anal regions of the wing.

As in the prothorax, the episternum (Eps.₂) constitutes the greater part of the pleural region. It is fused with the sternum (S.) which has a narrow, deep, mid-ventral groove extending

longitudinally throughout its whole length. On the episternum, a short distance behind its front margin, is a nearly vertical suture extending about half way up to the dorsal margin of the plate, crossing it beneath and continuous with the corresponding suture of the other side, separating the lower, anterior portion of each episternum from the remainder. This portion is called the prepectus (Ppct.₂). The epimeron (Epm.₂) is a narrow band separated from the episternum by a suture extending in a straight line from the hinder base of the fore wing downward and backward to the mesocoxa (Cx.₂). The sternal area is flat beneath, punctured and sometimes striated.

The distinguishable plates of the metanotum are the scutum, scutellum and postscutellum. The region here called metanotum is the one which has been usually termed the postscutellum of the mesothorax by the systematists. The metaseutum (Sct.₂) lies immediately behind the scutellum of the mesothorax. Its narrow dorsal surface is sunken below the surfaces of both the mesoscutellum and the metascutellum. Laterally it consists of two deflexed regions. The hind wings are dorsally attached by a membrane, to the scutum, and behind and below are similarly attached by a forward projecting process of the metapleuron. In the anal and humeral angles are borne the small, sub-alar basal wing sclerites. The scutellum (Sel.₃) consists of a raised median portion. Immediately posterior to the scutellum lies the postscutellum (Psel.₃) which is a sunken, narrow, transverse bank-like region fusing laterally with the metaepimeron.

The pleurum consists of an episternal and epimeral region, of which the former is much the larger. That portion of the pleurum which is fused with the metapostscutellum is epimeral (Epm.₃). The suture which separates the epimeron from the first abdominal segment becomes lost for most of the distance along the ventral margin of the latter segment, reappearing again for a short distance at its hinder, ventral portion. The main part of the episternum (Eps.₃) lies beneath the metaepimeron and its hinder margin articulates with the metacoxa (Cx.₃). The upper, anterior corner is prolonged into a narrow bank-like region lying between the mesoepimeron and the fused metapostscutellum, and metaepimeron. It is separated from each by sutures. The pleura are fused with the sternum which

is marked by a longitudinal mid-ventral groove, as in the mesothorax, and is continuous with it.

Wings

The wings are long and narrow, quite large, usually hyaline, marked more or less with dark spots. In some species the wings are entirely cloudy. The fore and hind wings are connected when in flight, by a row of frenal hooks on the hind wing hooking into the frenal fold of the front wing.

In describing the veins and cells, the terminology used by Cresson in his "Synopsis of the Hymenoptera of North America," will be followed here.

In the fore wing, the costal and subcostal veins are blended, therefore the costal cell is absent. They extend to a point a little beyond the middle of the wing, where there is a slight notch in the costa. From this notch, to a point about half way from it to the apex, is a thickened, darker strip which may be regarded as the stigma. Behind the blended costa and subcosta, lie the externo-medial and anal nervures. The externo-medial nervure at its outer end, meets the basal nerve obliquely; this basal nerve joins the subcosta at a point a little before the stigma. The cell outlined by these nervures is called the sub-medial or interno-medial cell. The anal nervure lies behind the externo-medial nervure and extends outward until it joins the anal margin at a point nearly two-thirds the length of the wing from the base. At the junction of the basal nerve with the externo-medial nervure, the transverse-medial nervure extends at nearly a right angle with the latter, to the anal nervure; thus outlining the sub-medial or interno-medial cell. Behind the anal vein and in front of the anal margin lies the long, narrow, anal cell. The marginal or radial nervure apparently arises from the hinder edge of the stigma and extends toward the apex, but before reaching it, turns forward to the front margin, thus enclosing the marginal or radial cell. The discoidal nervure extends from the junction of the externo-medial, basal, and transverse-medial nervures, outward until it joins the cubital nervure, where it bends abruptly backward and joins the anal nervure just before the latter reaches the anal margin. The cell outlined by the transverse-medial nervure

on its inner margin, the discoidal nervure on its front and outer margins, and the anal nervure on its hinder margin, is the second discoidal cell. The cubital nervure extends outward from the point where the discoidal nervure bends abruptly backward, and becomes lost a short distance before the outer margin. About the middle of the marginal nervure arises a cross nervure which passes backward and joins the cubital at about its middle. This nervure has been termed the first transverse cubital, and forms the outer margin of the very large, somewhat triangular cell lying behind the base of the stigma, called the cubito-discoidal cell. A short stump of a nervure projecting from the cubital into the cubito-discoidal cell is called by Cresson an "abbreviated cubital nervure." The real significance of this nervure will be discussed later. A short distance external to the first transverse cubital is another cross nervure, the second transverse cubital. The relation of these two nervures differs greatly, their anterior ends may be close together on the marginal nervure, while their posterior ends are some distance apart. These nervures enclose the areolet or second submarginal cell. In some cases, the anterior ends of the two transverse-cubital nervures are united for about half their length. In this case, the areolet is said to be petiolated. Occasionally, the second transverse cubital is lost or reduced to an abbreviated stub, in which case, the areolet is absent. The presence or absence of an areolet which has heretofore been used as a generic character, is not even a specific one, as both conditions have been found to occur in the same species.

The second transverse cubital nervure forms the inner margin of the third submarginal cell which extends outward to the outer margin of the wing. Its front border is formed by the outer half of the marginal or radial nervure, and its hinder border by the outer portion of the cubital nervures. Between the cubital nervure and the internal margin of the wing, extending nearly to the outer margin from about the middle of the backwardly turned portion of the discoidal nervure, is the subdiscoidal nervure. That portion of the discoidal nervure between the cubital and subdiscoidal nervures is the first recurrent nervure, according to Cresson, though here described as part of the discoidal. The second recurrent is a somewhat curved nervure

extending backward from the middle of the areolet to near the outer end of the subdiscoidal. The recurrent nervures form the inner and outer margin of the third discoidal cell, with the cubital forming its front and the subdiscoidal joining its hinder borders. The subdiscoidal nervure forms the front margin of the first apical cell, while its inner margin is formed by the outer part of the discoidal nervure and behind it is bounded by a small portion of the anal nervure, the outer part of the internal margin, the anal angle and the hinder portion of the outer margin of the wing. Between the cubital and subdiscoidal nervures and extending from the second recurrent nervure to the outer margin, lies the second apical cell. The frenal fold is near the outer end of the anal cell.

The writer is inclined to agree with Snodgrass⁵ in his interpretation of the venation of an Ichneumonid wing, as indicated by his Figure 76, rather than with that used by Cresson.⁶

The two systems agree in the main, the points of disagreement being the discoidal and first recurrent nervures. According to the system used by Cresson, the first recurrent nervure (l.) separates the two parts of the discoidal nervure (j.).

In the fore wing of *Mellinus* which Cresson⁷ uses as a typical Hymenopteron wing, the two recurrent nervures are very distinct and there can be no question raised as to their identity. Here, the first recurrent nervure extends from the discoidal nervure (j.) to the cubital nervure (k.). In the fore wing of *Megarhyssa lunator*, the cubital nervure at its anterior end is but an abbreviated stump. According to Snodgrass, the vein from (j.) to (k.) forms the first recurrent nervure (No. 16, fig. 76). This agrees with the condition found in *Mellinus* and seems to be a more plausible explanation than calling it part of the discoidal nervure (l.) with parts of the latter on either side of it (j.). If Snodgrass's interpretation is accepted, then the discoidal nervure remains as such from beginning to end.

In *Mellinus* the first transverse cubital nervure extends forward from the point where the first recurrent nervure joins the cubital, to the marginal or radial nervure, but in the fore wing

⁵ 'Thorax of Hymenoptera,' 1910, pl. 6, fig. 76.

⁶ Synopsis of the Hymenoptera of North America, p. 38, fig. 9.

⁷ Synopsis of the Hymenoptera of North America, p. 5, fig. 4.

of *Megarhyssa lunator*, the transverse cubital nervure is lost. As a result of this, the so-called cubito-discoidal cell includes not only the first, but the second cubital cell, and the cells spoken of by Cresson as the second and third cubital cells are in reality the third and fourth cubital cells. The nervures (f.) and (g.) though called the first and second transverse cubitals are actually the second and third.

In the hind wing the nervures and cells are fewer in number than in the fore wing. The subcostal nervure runs outward from the base of the wing for nearly two-thirds the length of the latter, joining the costa at a small notch in the costal margin. From this point the radial or marginal nervure passes obliquely outward and backward to the outer margin some little distance behind the apex. Behind the subcostal lies the externo-medial nervure, which passes outward, gradually diverging from the former till intersected by two cross nervures. Beyond the intersection it continues to the hinder margin, this portion being termed the discoidal nervure. Behind the externo-medial nervure is a third longitudinal nervure which extends from the base of the wing to its hinder margin, which it reaches a short distance before the middle of the margin. The externo-medial nervure is intersected in front by the cubital nervure, the two uniting at nearly right angles. The latter abruptly turns outward, however, and gradually backward and reaches the hinder margin of the wing about half way between the ends of the discoidal and marginal nervures. At about its middle, it is joined by the hinder end of the transverse cubital nervure which passes forward, then outward, then forward and unites with the marginal nervure near its middle. From the point of intersection of the externo-medial and cubital nervures the transverse medial originates, extending backward and inward and joins the anal nervure a short distance before the latter reaches the wing margin.

The cell lying between the costa and the subcostal nervure is known as the costal cell: that in front of the marginal or radial nervure, as the marginal or radial cell: that bounded in front by the costal and part of the radial nervures, behind by the externo-medial and the inner part of the cubital nervures, and externally by the transverse cubital nervure—the largest cell of the wing—

is the median cell. Between the outer parts of the marginal and cubital nervures, external to the transverse cubital nervure is the submarginal or cubital cell. Behind this, between the cubital and discoidal nervures lies the first discoidal cell. Between the externo-medial and anal nervures and extending from the base of the wing to the transverse medial nervure, lies the submedian cell, external to which and separated from it by the transverse medial nervure lies the second discoidal cell. The area behind the anal nervure is known as the anal cell.

Legs

The legs are long and slender, the coxa being the stoutest part of each leg. The coxae, trochanters, femora and tibiae, which are clothed with minute hairs or spines, are sometimes almost pubescent. At the outer end of each tibia are two long spines of unequal length, on the sides towards the body. The tarsi are covered with short spines becoming longer at the end of each segment.

On the fore legs, the coxae are large, but are the shortest ones of the three sets. Each is sub-conical in form, with the trochanter articulating at its apex. The trochanter is well developed and composed of two segments, the first being the larger. Its base is cylindrical, but at the tip of the second section where it articulates with the femur it is flattened.

The fore femur is the shortest of any. At its articulation with the trochanter, it is flattened and for a short distance it decreases in width. It then begins to widen and thicken, becoming sub-cylindrical just before articulating with the tibia.

The fore tibia is the only one which is shorter than its femur. It is narrow and cylindrical at its base of articulation, but gradually increases in size to its outer end. Its outer side is clothed with short spines.

The tarsus is composed of five segments, all of which are cylindrical and slightly enlarged at their outer ends. They decrease in length from the tibia outward to the fifth segment which is slightly longer than the fourth. On that portion of the tarsus overlapped by the tibial spurs is a raised area, which together with the latter, forms a cleaning apparatus. The longest spines of the tarsus are found at the tip of the fourth

segment. At the tip of the fifth is a pair of strong, well-developed, incurved claws, between which is a large pulvillus.

The middle coxa is larger than the fore coxa and is more cylindrical than conical. The middle femur is straighter and longer than the fore femur. At its base it is narrow, but soon broadens out and remains the same width for the rest of its length. The middle tibia is longer than the fore tibia and also longer than the middle femur. In all other respects the middle leg is like the fore leg.

The hind legs are the longest and in all respects they resemble the middle legs rather than the fore legs.

Abdomen

The abdomen consists of nine visible segments. It is depressed behind the propodeum but towards the end is mostly compressed. It has lateral impressed lines on segments three to six, which converge toward the middle of the base. The abdomen is sometimes finely, transversely aciculated. The dorsal portion is coriaceous.

The first segment of the abdomen is the median segment or propodeum, and has often been considered to be part of the metathorax. Anteriorly it articulates with the metapostscutellum and the metaepimeron. The latter extends along its lower border. The sternum of this segment is either lost or has fused with the metasternum. The pleural elements have fused with the notum forming a single continuous plate. It is usually smooth, but in some cases has a channeled groove along its mid-dorsal line and may even be areolated. The presence or absence of these areolations is used for generic distinction. On either side it bears a large spiracle, these forming the largest spiracles found in the abdomen.

The actual second segment, usually rated as the first by systematists, is constricted at its base, joining the true first segment or propodeum as by a stem. Its attachment is such that it is enabled to articulate freely. Here as in all the rest of the segments, the pleura are fused with the notum. It is straight, with its spiracles placed before the middle and closer to each other than to the apical margin. These facts are made use of in classifying to the tribe. At the base of this segment, the fused

notum and pleura become fused with the sternum for a greater or lesser distance. The amount of this fusion is used in classification to species, and the presence or absence of it is made use of for generic distinction. The sternum is divided into an anterior and a posterior portion by a transverse groove. The latter portion is again divided into two parts by a longitudinal mid-ventral groove.

Considerable variation from the typical form in regard to the construction of the sternal plate has been found. A large part, often as much as half of the posterior portions of this plate may be membranous in place of being mainly composed of chitin, as is the case in some species. It is impossible to determine whether this characteristic is the primitive condition or is a degeneration, though the weight of evidence would point towards the latter, as the few species possessing this modification are in other respects the most highly developed of this group.

The third segment, like the second, is truncate at its apex, while the fourth, fifth and sixth segments are prolonged laterally at the apex. There is a gradual increase in size in these segments, otherwise their structures closely resemble each other. In each, the notum and pleura are fused, but the sternum is a separate plate. On the pleura are laterally impressed lines converging toward the base. The sternal plates of these segments are separated by a mid-ventral longitudinal groove. On either side of this groove is a small projection, the tips of which point toward each other. The size and position of these projections vary in different genera. This character is used for generic classification.

In the female the last three segments of the abdomen are highly specialized. Ventrally they are plow-share shaped. The seventh is the deepest segment of the abdomen. Its ventral plate, however, is very small. Between the dorsal portions of the seventh and eighth segments is the membrane used by the female for coiling up the ovipositor, before thrusting it into the tree in which she desires to oviposit. The ovipositor becomes external on the ventral side between the seventh and eighth segments. It is long and slender, varying in length; in some species attaining a length of five or six inches and is always longer than the body of the insect. It is composed of three lateral sections which interlock. The ventral plates of the eighth

and ninth segments are for the most part membranous. The base of the sheaths of the ovipositor arises in these ventral plates and extends thus nearly to the apex of the abdomen. Near the apex comes a decided break where the sheaths proper are articulated. These are long and slender, equalling the ovipositor in length. They are concaved inwardly and convex with ridged rings outwardly. The nota of the eighth and ninth segments are small, but their pleura extend backward and are overlapped and partially concealed by those of the seventh segment. On the apex of the ninth segment is a small, blunt, rod-like projection, and beneath on either side of the groove which receives the sheaths is a small cercus. Both of these parts are probably tactile in their nature.

Sex Distinction

The presence or absence of the ovipositor and its sheaths is the most readily noticed sex distinction, but there are others not so easily noticed. The sternal plates of the female are longitudinally divided and the small projections described above are usually present, while in the males, the sternal plates are entire and the projections are absent. The abdomen of the female increases in size towards its apex while that of the male is long, slender, and approximately of the same width throughout. The small rod-like projections on the ninth segment of the female are, of course, lacking in the male, their positions being occupied by the male external genital organ. The ventral cerci of the female are absent in the male but the male has a pair of small cerci on the dorsal apex of the eighth segment which are not found in the female.

CLASSIFICATION

Tribe **Pimplini**

Ashmead, Proc. Ent. Soc. Wash., iii, p. 278, (1895).

Schmiedeknecht, Genera Insectorum, 62nd fascicle, p. 18, (1907).

On May 3, 1895, Ashmead read a paper before the Entomological Society of Washington, which was later published in the Proceedings of that society, in which he proposed the breaking up of the sub-family *Pimplinae* into a number of tribes, one of which was to be called *Pimplini*.

The following synoptic table leading to the tribe *Pimplini* is taken from the 62nd fascicle of the Genera Insectorum.

1. Head more or less cubical, more rarely globular. Mandibles extended, and with the clypeus downwardly bent at the tip, as a rule, forming the mouth opening. Antennae and legs mostly long and thin, Tribe **Xoridini**
Head transverse, rarely somewhat elevated. Mandibles with the clypeus forming no apparent mouth opening.....2
2. Abdomen depressed, rarely somewhat compressed at the tip. The last abdominal segment not large. Hind legs, particularly, not the hind coxae, neither strikingly long nor stout. Antennae almost entirely long and slender.....3
Abdomen behind more or less laterally compressed. The last ventral segment, generally plow-share shaped and standing out, sometimes very large, lancet-shaped, very rarely small and transverse. Hind legs or at least hind coxae strongly lengthened and generally strongly thickened. Antennae more or less short and stout.....
.....(Tribes not included in this paper)
3. Abdomen with more or less distinct impressions, mostly also strongly punctured. When smoother and without elevations, then segments 2 to 5 have deep impressed, oblique lines on both sides which converge toward the middle of the base..... Tribe **Pimplini**
Abdomen without, or with entirely indistinct impressions, and without coarse sculpturing, more or less smooth or finely punctured or leather-like..... Tribe **Lissonotini**

The characters of the tribe *Pimplini* are: Head transverse, rarely somewhat elevated. Abdomen depressed, only toward the end mostly compressed, with more or less distinct impressions or elevations, usually punctured, rarely smooth, if smooth alutaceous or coriaceous, always with lateral impressed lines on segments 2 to 5 which converge toward the middle of the base. Mandibles with front border of clypeus not forming a mouth-opening. Hind legs not conspicuously lengthened and thickened.

SYNOPTIC TABLE TO GENERA HERE TREATED

Females

1. Mesonotum transversely rugose 2
Mesonotum not transversely rugose.....(Genera not treated.)
2. Head with carina between the antennae..... **Apechoneura**
Head with a carina between the antennae..... 3
3. Sternal plates of abdomen entire..... **Pseudorhyssa**
Sternal plates of abdomen divided by a median-longitudinal groove. . . . 4

4. Projections along groove of the sternal plate nearer the base of each segment than its apex..... **Megarhyssa**
 Projections on sternal plate situated about mid-way between base and apex of each segment..... **Rhyssa**

Males

1. Propodeum areolated; head without a carina between the antennae..... **Pseudorhyssa**
 Propodeum not areolated..... 2
 2. Pleura and sternum of second abdominal segment fused for a short distance..... **Megarhyssa**
 Pleura and sternum of second abdominal segment not fused..... **Rhyssa**

Genus **MEGARHYSSA** Ashmead

Thalessa Holmgren, Öfvers. Svensk. Vet.-Akad. Förh., xvi, 1859, p. 132.

Megarhyssa Ashmead, Can. Ent., xxxii, 1900, p. 369.

Megarhyssa Dalla Torre, Cat. Hym., iii, 1901-2, p. 479.

Thalessa Schmiedeknecht, Gen. Ins. Fasc. 62, 1907, p. 63.

Genotype: (*Ichneumon clavator* Fabricius). [Sic]= (*Ichneumon*) *Megarhyssa clavatus* (Fabricius)= (*Ichneumon*) *Megarhyssa Superbus* (Schrank). Vide Viereck, Proc. U. S. Nat. Mus., Bull. 83, p. 144, (1914.)

In *Megarhyssa* the clypeus is usually anteriorly truncate, the abdominal segments in the male are smooth, with segments 3 to 7 at the apex emarginate or deeply excavated. The sternal plate of the second abdominal segment is for a greater or lesser distance fused with the pleura at its anterior end. The amount of fusion varies with the species. The sternal plate of this segment is largely membranous, the chitin being apparently degenerated. Between the seventh and eighth segments, issues the membrane used by the female in ovipositing, as already described. The projections of the sternal plates of segments 3 to 6, on either side of the mid-ventral groove are longer than in *Rhyssa*, and are situated nearer the base than the apex of each segment.

Table to Females

1. Insects black or mostly black..... 2
 Insects yellow or yellowish red..... 4
 2. Black with white spots on the abdomen..... **humida** (Say) (p. 126)
 Black without white spots on the abdomen..... 3
 3. Ovipositor at least twice as long as the body..... **atrata** (Fabr.) (p. 128)
 Ovipositor not twice as long as the body..... **canadensis** (Cress.) (p. 129)
 4. Areolet in fore-wings absent..... **mexicana** (Cress.) (p. 131)
 Areolet in fore-wings present..... 5

5. Rounded spots on the sides of the abdomen... **nortonii** (Cress.) (p. 131)
 No rounded spots on the sides of the abdomen..... 6
6. Yellow band behind the eyes bordered posteriorly with a black band.
 In second abdominal segment, pleura and sternum fused as far as or
 but slightly beyond the spiracles, wings clouded at their tips.....
 **lunator** (Fabr.) (p. 133)
- Yellow band behind the eyes not bordered posteriorly with a black band.
 Fusion of pleura and sternum extending twice the distance from base
 of segment to spiracles, wings not clouded at tips. **greenei** (Vier.) (p. 136)

Table to Males

1. Black or mostly black..... 2
 Not black..... 3
2. Abdomen with white spots on its sides..... **nitida** (Cress.) (p. 137)
 Abdomen without white spots on its sides.... **canadensis** (Cress.) (p. 129)
3. Recurrent nervure interstitial with outer transverse cubital.....
 **nortonii** (Cress.) (p. 131)
 Recurrent nervure not interstitial..... 4
4. Wings fuscous..... **atrata** (Fabr.) (p. 128)
 Wings not fuscous..... 5
5. Yellow behind the eyes bordered by a black band extending around the
 head nearly to the mandibles, wings clouded at tips.....
 **lunator** (Fabr.) (p. 133)
 Yellow behind the eyes merging into a light brown band, wings not clouded
 at tips..... **greenei** (Vier.) (p. 136)

Megarhyssa humida (Say)

Pimpla humida Say, Boston Journ. Nat. Hist., i, pt. 3, 1836, p. 224, n. 1, ♀.

Pimpla humida LeConte, Writings of Thos. Say, ii, 1859, p. 683.

Rhyssa humida Dalla Torre, Cat. Hym., iii, 1901-2, p. 483.

Type. As this species was named by Say, the type cannot be located.

The female of this species is about half an inch long with an ovipositor slightly longer than the body. The head is yellowish-white with the vertex and a broad central band extending to the base of the insertion of the antennae dark, as is also the clypeus. There is a large dark spot in the middle of the lower margin of the frons from which a dark band extends to the antennae. The mandibles are black but the palpi are white. The antennae are brownish-black.

A broad yellowish-white band extends forward along the upper border of the prothorax from the tegula nearly to the middle line in front and downward at its posterior end, making the spot somewhat L-shaped. Beneath this band is a broad dark band running parallel to it, which occupies almost all of the remaining portion of the prothorax. Just below this dark band and above the procoxa is a pale rufous streak. The prosternum is pale rufous. The mesonotum is dark as is the prescutum. This dark color from the prescutum

extends backward between two parallel, longitudinal, yellowish-white bands on the mesonotum to the mesoscutellum. The center of the mesoscutellum has a square yellowish-white spot on it, and is interrupted at its front margin by a dark one. The posterior margin of the entire plate has a narrow white line, the remainder of the plate is black. On the metascutellum (generally called postscutellum) is an oblong yellowish-white spot. Both front and rear margins of this plate have a yellowish-white line, each side is black and a black line crosses from one side to the other just in front of the oblong spot. The mesosternum and metasternum as well as their pleura are pale rufous. The tegula, a raised spot beneath the fore wing and another spot below this are yellowish-white. The notum of the propodeum is dark with a yellowish-white spot separating it from the rufous pleura at its posterior end. The legs are pale rufous, with the knees, tibiae and tarsi whitish. The exterior surface of the middle tibiae and tarsi as well as the tarsal tips and sutures are darker. In the posterior tibiae the outer extremity is darkened and the tarsal segments become darker toward the tarsal claws, which are brownish-black. The wings are hyaline with dark brown nervures. The stigma is pale fuscous at its base but becomes darker towards its apex. The areolet is petiolated and the recurrent nervure enters it in the middle.

The abdomen is dark brown, polished and transversely aciculated above, and obliquely aciculated at the sides. On the notum of the second segment is a broad, dorsal depression extending from the base nearly to its tip. On the third, fourth, fifth, sixth, seventh and eighth segments are roundish, yellowish-white spots, which on the last two segments become elongated, with their axis at right angles to that of the body. The venter is yellowish-white with brown bands. The ovipositor is of a reddish-brown with darker colored sheaths.

Male unknown.

Megarhyssa humida is more apt to be confused with *Rhyssa persuasoria* than with any other species, yet an examination of the sternal plates will show a marked difference. The fact that the pleura and sternum of the second abdominal segment are fused for a short distance will serve to distinguish it from *Rhyssa persuasoria*. The fact that the mesosternum and metasternum of *M. humida* are rufous and not black is another distinguishing character. It can be distinguished from *M. atrata* by the absence of the yellowish-white markings found on the latter. It can be distinguished from *Megarhyssa nortonii*, *canadensis*, *lunator*, *greeni*, and *mexicana* by the presence of its yellowish-white orbits.

This species was described by Say as *Pimpla humida* and was later put into the genus *Rhyssa* by Walsh, but the structural characters of the sternal plates, the fusion of the pleura and sternum of the second abdominal segment, the ends of the

abdominal segments being acute instead of truncate, would seem to place it in *Megarhyssa*. It would also seem that this might be the female of *M. nitida* on account of the similarity of color-markings, size, and its petiolated areolet. If this should prove true the name *M. nitida* would fall into synonymy.

Megarhyssa atrata (Fabricius)

Ichneumon atrata Fabricius, Spec. Insect., i, 1781, p. 436.

The following references are in addition to those given by Dalla Torre:

Lintner, Country Gentleman, July, 1883, p. 561.

Harrington, Can. Ent., xix, 1887, p. 206.

Riley, Insect Life, i, 1888-89, p. 168 et seq.

Smith, Insects of New Jersey, 1909, p. 627.

This species varies from about an inch to an inch and three-quarters in length, with a very long, dark-brown ovipositor, which in some cases attains a length of five or six inches. The head and antennae are yellow. The ocelli are embedded in a transverse dark band extending between the compound eyes. There is another transverse dark band at the point of insertion of the antennae, not quite reaching the compound eyes, and a black spot on the face just above the clypeus. The ground color of the thorax is a glossy black with a yellow spot in the prothorax just in front of the fore wing, one beneath the fore wing, and one on each side of the propodeum near where it articulates with the second abdominal segment. On each side of the mesoscutellum is a short, longitudinal dash, while in the center of the metascutellum (generally called post-scutellum) is a transverse yellow dash. The legs are yellow with the coxae, middle and hind trochanters, black and the fore-trochanters partly yellow. The procoxae each bear a more or less indistinguishable yellow spot. The middle and posterior femora are black with yellow tips. The tibiae are yellow, but the tarsal segments are darker at their outer extremities and the tips of the tarsal claws are black. The wings are fusco-hyaline and show an iridescence in some lights. The stigma is pale ferruginous at its base becoming darker toward its apex. The abdomen is brownish-black, some parts being slightly lighter than others.

M. atrata may be distinguished from *M. lunator*, *greenei*, and *mexicana* by its very dark abdomen. Its yellow antennae will distinguish it from *nitida*, *canadensis*, and *humida*. Its larger size would also serve to distinguish it as well as the length of the ovipositor, which is several times the length of the body.

Its life history is similar to that of *M. lunator* and *M. greenei* with which it is commonly found associated. The dates of capture of specimens seen range from June 2 to September 15.

The male of *M. atrata* differs from the female very markedly in its color markings. The structural sex differences are the same in *M. atrata* as in *M. lunator*. In general the male has

more yellow upon it than the female. The dark spot on the face just above the clypeus may or may not be present. The antennae are dark-brown but lighter beneath toward their tips. The upper margin of the prothorax is marked by yellow and this color may in some instances form a border around it, leaving a polished black spot in the center. Beneath the fore-wing is a raised yellow spot. Just below it and extending backward to the mesoepimeron and nearly down to the sternum is a yellow area. This area may be partly divided into two by a darker stain running through it. The prescutum is yellowish-brown and from it two bands of yellow or light brown pass backward over the mesonotum throughout its whole length, and it may be also more or less completely margined by the same color. A large yellow spot starts on each side of the metathorax at its upper margin and extends dorsally, covering the pleura of the propodeum and nearly meeting the other on the notum. Just before the hinder margin of the notum of the second and sometimes of the third abdominal segment is a narrow transverse yellow band. The rest of the abdomen is brownish-black, lighter in spots. *M. atrata* may be distinguished from *lunator* by the absence of clouded areas in the fore-wings, from *M. greeni* by its fusco-hyaline wings, and from *nortonii* by receiving the recurrent nervure in the middle of the areolet.

Megarhyssa canadensis (Cresson)

Dhyssa canadensis Cresson, Can. Ent., i, 1885, p. 35, ♀.

Location of type.—In the collection of the American Entomological Society of Philadelphia.

The female of this species is about half an inch long with an ovipositor slightly longer than the body. The head is dark brown to black. The facial orbits are marked with a yellowish-white band interrupted at the point of insertion of the antennae and ending at the vertex. The posterior orbits in the lighter colored specimens are marked by a lighter brown. The palpi are whitish. The dark portion below the antennae is slightly raised medially and the whole is irregularly, transversely, striated. The antennae are dark brown becoming lighter and somewhat larger toward their tips.

The thorax is dark brown to black and its sides are clothed with numerous short, erect, whitish hairs. The tegulae are yellowish-white. The meso-scutellum and metascutellum (or postscutellum) are transversely striated. The sides of the thorax are highly polished and in the mesothorax are densely punctured. In the lighter specimens the prothorax is marked with a lighter

brown similar to that of the posterior orbits. In the lighter specimens the rear margin of the mesoscutellum, an oblong spot in the centre of the metascutellum and a line on its rear margin are rufous. In the darker specimens these plates show no color markings. The propodeum is transversely striated above, punctured below, with a median longitudinal depression extending nearly to its posterior margin. The wings are fusco-hyaline tinged with yellow, and slightly more fuscous nervures and stigma except at their base where they are lighter. The areolet is small, petiolated, with the recurrent nervure entering at its middle. The legs are pale rufous. The fifth segment of the anterior and middle tarsi, and the claws are dark. The posterior femur bears a dark spot at its extremity as does the tibia near its base. The tibia is darker along its external surface completely enveloping its outer half. The posterior tarsal segments are darker on their external surface, this dark color increasing towards the claws, which are all dark.

The abdomen is dark brown to black, transversely aciculated above, these aciculations bending forward at the sides. The ovipositor is dark brown with darker sheaths.

The male of this species, from the collection of the U. S. National Museum (here described for the first time), is slightly less than half an inch long. The head is black. The antennae are black at their base but become lighter and somewhat larger toward their tips. From the base of the antennae down to the clypeus the face is yellowish-white. This spot is prolonged to the vertex in the form of bands margining the compound eyes.

The thorax is black and polished. The sides of the mesothorax and metathorax are densely punctured. The mesoscutellum and metascutellum are transversely striated. The propodeum is transversely striated except along the median, longitudinal depression, which extends nearly to its posterior margin. Its sides are punctured. Numerous short, erect, whitish hairs clothe the thorax.

The wings, legs and abdomen are as in the female.

In size and general appearance *M. canadensis* resembles *humida* more closely than the other *Megarhyssae* but the absence of white spots on the side of the abdomen would serve to distinguish it from *humida* as well as from *atrata*. Its dark brown to black color with whitish color markings would distinguish it from *lunator*, *greeni*, *nortonii* and *mexicana*.

This species was originally described by Cresson as *Rhyssa canadensis*, but the structure of its sternal plates, the fusion of the pleura and sternum of the second abdominal segment, and the acutely angled tip of the abdominal segments would seem to place it in *Megarhyssa*.

Megarhyssa mexicana (Cresson)

Epirhyssa mexicana Cresson, Proc. Acad. Nat. Sci. Phila., 1893, p. 391, ♀.

No statement about the types accompanies the description, but a range in length measurement implies that more than one specimen was examined and there are two specimens labeled, "Type No. 599," from Mexico, in the collection of the American Entomological Society of Philadelphia.

♀. This species is about an inch long, with an ovipositor a little longer than the body. The head is yellow but the mandibles are black. The region in which the ocelli are imbedded and extending between the compound eyes is slightly darker than the ground color of the head. Parallel and posterior to this darkened area is a dark band which nearly encircles the head. The suture from the compound eyes to the mandibles and extending across the upper part of the clypeus is also dark. The antennae are dark brown, except the under side of the scape which is lighter colored than the flagellum.

The ground color of the thorax is pale yellow. The sutures separating the mesonotum from the prescutum, prothorax and mesoscutellum are dark. A dark band runs along the center of the prescutum and another on each side of the mesonotum runs from the prescutum back to the mesoscutellum. The suture separating the mesothorax from the metathorax and the propodeum is also dark. The legs are yellow and the tarsi become darker toward the tarsal claws which are dark brown or black. The suture dividing the posterior femur from its trochanter is dark. The wings are faintly yellow-hyaline, clouded at their tips and without an areolet in the specimens examined.

The abdomen is yellow, smooth, and glistening. The tips of the second, third, fourth, fifth and sixth segments are each bordered with a black band. In the remaining segments these bands are nearly obsolete. The ovipositor is dark brown.

Male unknown.

Distinguishing characters.—*Mexicana* may be distinguished from the other species of *Megarhyssa* by its yellow abdomen without spots and probably by the absence of the areolet in its fore wings.

This species was placed in *Epirhyssa* by Cresson, but the structure of its sternal plates agrees with those of *Megarhyssa* and the presence of the areolet seems to be a variable character in this group.

Megarhyssa nortonii (Cresson)

Rhyssa nortonii Cresson, Proc. Ent. Soc. Phila., iii, p. 317, ♀.

Thalassa quebecensis Provancher, Natural Canad., v, 1873, p. 317, ♂.

Thalassa nortonii Provancher, Faun. Ent. Canad.; Hymen., 1883, p. 145.

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Type.—In the collection of the American Entomological Society of Philadelphia.

The female of this species varies from about an inch to an inch and a half in length, with an ovipositor about twice the length of the body. The head is yellow, marked with dark-brown or black. There is a dark band extending across the upper part of the head between the front margins of the compound eyes, in which the ocelli are embedded. From this dark band back to the occiput extends a dark brown to black area, slightly lighter in color than the transverse band. From the latter, a dark band extends down to the labrum, where it broadens out, extending to the lower margins of the compound eyes, and thence downward covering all of the lower part of the head in front. The antennae are dark brown to black with the scape and pedicel more glistering than the flagellum. The ground color of the thorax varies from brown to black. There is a yellow spot on the side of the prothorax, another beneath the wing, on the side of the metathorax, and on the propodeum just above. In the lighter specimens these propodeal spots may be confluent over the dorsum. The mesonotum may be brown with black markings, black with ferruginous markings, or entirely black. The mesoseutellum has a square yellow spot in its center and the metascutellum (generally called postscutellum) has an oblong yellow spot. The wings are hyaline, tinged with yellow, giving a faint violet reflection in some lights. The stigma is pale-ferruginous. The legs are yellow varying with darker shades of the same color. The coxae vary from dark brown to black. The middle and posterior femora are dark with their tips yellow, as are also the tibiae. The tips of the tarsal claws are black. The abdomen is slightly lighter in color than the thorax. Just before the hinder margin of the notum of the second and also of the third abdominal segments is a small transverse yellow band. In the darker colored specimens, reddish-yellow spots are found on the sides of the segments. The spots on the anterior portion of the abdomen are about in the middle of each segment, but they gradually move forward, so that in the posterior segments they are found on the anterior margins. In the lighter colored specimens they are not distinct and form spots only a little lighter than their surroundings. On each side of the fourth, fifth, sixth, seventh, and eighth segments is a yellow spot, more or less oval in form. The long axis of the spot on the last two segments is nearly at right angles to the body axis.

In *M. nortonii* the yellow spots on the sides of the abdomen are rounded-oval, while in the closely related *M. lunator* and *M. greenei* they form angled bands. In *M. nortonii* there is a dark stripe extending from the vertex to and including the mandibles, in *M. lunator* there are two dark lines running from the antennae to the mandibles, and in *M. greenei* these lines are absent. *M. nortonii* can be distinguished from *M. mexicana* in that the latter has a pale-yellow ground color, with black markings on the abdomen. The wings of the latter are clouded

at the tips, and possess no areolet, neither are there any dark markings on the face. *M. nortonii* may be distinguished from *M. atrata*, *humida*, *canadensis* and *nitida* by the fact that in these latter forms the greater part of the surface of the body is black, with white, yellow, or fuscous body markings.

Megarhyssa nortonii is widely distributed throughout the United States, Canada, and Alaska. Specimens taken from the Pacific coast ranging from Alaska down through California, exhibit in general much darker color markings than those taken east of the Rocky Mountains.

Provancher described *M. nortonii* as *Thalassa quibecensis* in 1873, but as he applied the identical description to *Thalassa nortonii* in 1883, it shows that he recognized that the two were identical. The dates of capture of specimens seen range from May 20 to Aug. 7.

Male. Not having seen what he would consider a bona-fide specimen of a male *nortonii*, the writer will use a translation of Provancher's description of a male.⁵

Male. Length one and one-tenth inches. Differ little from the female. The polished plaque of the two sides of the prothorax is without yellow spots. The metathorax is clearer towards its extremity, without spots on the sides and flanks are of a uniform, shiny red. Segments one and two have a yellow band towards the summit. The second segment is the same as that of the female, bordered with black at both ends and on the sides. The recurrent nervure is interstitial with the outer transverse cubital.

Megarhyssa lunator (Fabricius)

Ichneumon lunator Fabricius, Spcc. Insect., i, 1781, p. 430, n. 64.

The following references are additions to the list given by Dalla Torre:

Lintner, Country Gentleman, July 1883, p. 561.

Harrington, Canadian Entomologist, xix, 1887, p. 206.

Riley, Insect Life, i, 1888-89, p. 168 et seq.

Smith, Insects of New Jersey, 1909, p. 627.

There seems to be no record of the present location of the type of this species.

♀. The individuals of this sex vary in length from three-quarters of an inch to an inch and a half, and the ovipositor from an inch and a half to three and three-quarters inches. The head is yellow with a transverse dark band on its vertex, in which are inserted the three ocelli. Another dark band behind the former and running parallel to it, almost encircles the head. A dark line runs from the base of each antenna to the labrum. The mandibles are dark brown, stout and bidentate. The antennae are dark brown and slender.

⁵Le Naturaliste Canadien, v, 1873, p. 445.

The ground color of the thorax and propodeum is yellow, varying somewhat in shade but generally rather light. The markings range from yellowish-brown to black and seem in some places to be situated on the margin of the sclerites to quite an extent. The ground color of the legs is yellow, like the thorax, becoming darker toward the tips. Spots and streaks of brown occur here and there.

The prescutum which is practically circular in outline is margined with brown or black, and from its hinder margin a band of this color extends to the hinder end of the mesoscutum and a broader band narrowing posteriorly, extends backward on either side. The ground color of the mesoscutum appears as a pair of longitudinal bands and a narrow margin above the tegula at each side.

In the fore wing there is a brown, sometimes almost blackish, area covering the stigma and extending backward across the radial cell, the tip of the cubito-discoial cell and frequently more or less involving the areolet. The tip of the third submarginal cell is also covered by a spot of this kind, less pronounced, however, than the other.

The abdomen is brown, varying considerably in shade, with bands and lines of yellow. Just in front of the hinder margin of the notum of the second and also of the third segments is a transverse yellow band, slightly bent forward at its ends. These yellow bands in the lighter forms are margined with brown distinctly darker than that of the segments as a whole. In the darker form these margins are not in evidence. On the fourth, fifth and sixth segments, these bands are extended forward almost to the spiracles, then toward the hinder end and upward, following the general outline of the end of the segments, the two parts of the band forming an acute angle. These bands are not continuous across the dorsum, nor are the dark bands which margin them, but in the eighth segment the yellow band is continuous.

The fusion of the pleura with the sternum of the second abdominal segment extends from the base of that segment out to, or but slightly beyond the spiracles.

The male *lunator* differs from the female only in the following respects: the abdomen of the male is sub-cylindrical throughout and not plow-share shaped as in the female. The pleura are extended downward completely enveloping the sterna of all but the second, third and a small portion of the fourth segments. The sterna are not longitudinally divided by a groove and therefore cannot show the median-sternal projections which may be seen in the female. There is more variation in the color markings of the male, some specimens showing a dark spot on the face above the clypeus: just before the apex of the second and also of the third abdominal segments is a short transverse yellow band, slightly notched at the center of its inner margin. These bands are the only color markings on the abdomen. This sex may be distinguished from the male *atrata* by the spotted wings, and from *nortonii* by the recurrent nervure entering at the middle of the areolet.

Distinguishing Characters.—*Lunator* may be distinguished from *greeni* by the following differences. It has dark lines from the base of the antennae to the labrum, a dark band parallel to the

one in which the ocelli are imbedded, dark patches on the tips of its wings, which characters are absent in *greeni*. In *lunator* the fusion of the pleura with the sternum of the second abdominal segment extends to or but slightly beyond the spiracle, while in *greeni* it extends as far beyond the spiracle as the distance between the spiracle and base of the segment. In *lunator* the dark bands on the abdominal segments are not continuous over the dorsum, while they are in *greeni*. On the eighth segment of *lunator* the yellow band is continuous but this condition does not occur in *greeni*. In *lunator* the ovipositors are relatively longer than in *greeni*, being from two to two and a half times the length of the body, and in *greeni* from one to one and a half times.

Lunator may be distinguished from *nortonii* by the shape of the markings on the 4th, 5th and 6th abdominal segments. In *lunator* they are acutely angulated bands, while in *nortonii* they are roundish spots. The wings of *lunator* are hyaline, with dark spots, while in *nortonii* they are transparent, fuscous and with no dark patches. It can be distinguished from *mexicana* in that the latter is bright yellow marked with black. The apical margins of the abdominal segments of *mexicana* are bordered with black bands continuous over the dorsum. The areolet of the fore wings of *mexicana* is absent. It also has a dark patch on the tip of the fore wing but none in the region of the stigma. *Mexicana* has no dark lines from the base of the antennae to the labrum.

Lunator may be distinguished from *atrata*, *humida*, *canadensis* and *nitida* by the fact that in these forms the greater part of the surface of the body is black with white, yellow or fuscous body markings.

This species is widely distributed throughout the United States and Canada. It is found in abundance on trees and logs which are infested with *Tremex*, working in company with *M. atrata* and *M. greeni*. They appear early in the summer and throughout the whole season may be seen crawling about, seeking a favorable spot for ovipositions. After laying its egg the insect is often unable to extricate its ovipositor and is held a prisoner by it until death. Mr. C. W. Johnson, Curator of the Boston Society of Natural History, observed a large number of males

massed together on a log in Maine. He attempted to capture them with his net, but they all flew away. Returning to the same spot later, he found the males again assembled there. This time he reached out and caught a number with his hand. Upon being examined they were found to be males of both *M. lunator* and *M. greeni*. The female, which later emerged, proved to be a specimen of *M. lunator*. Whether there was a female of *M. greeni* about to emerge near where the *M. lunator* came out, or whether the males are unable to know in advance, the species to which the emerging insect belongs, is a question.

The dates of capture of the specimens of this species which have come under my observation range from May 13 to September 30, although these are very probably not the outside limits.

Megarhyssa greeni Viereck

Megarhyssa greeni Viereck, Proc. U. S. Nat. Mus., xl, p. 191, ♀ ♂.

Smith, Insects of New Jersey, 1909, p. 627.

Viereck, Proc. Ent. Soc. Wash., xiii, no. 2, p. 96.

Type.—Cat. No. 13,499, U. S. N. M.

Type locality: Harrisburg, Pennsylvania; female, June 25, male, August 22, 1908.

Megarhyssa greeni agrees with *M. lunator* except in the following details. It has no dark lines extending from the base of the antennae to the labrum. The band parallel to the one in which the ocelli are imbedded, which in *M. lunator* is dark brown or black, in *M. greeni* is but slightly darker than the yellow ground color of the head. There is no dark patch on the tip of the wings. The fusion of the sternum and pleura extends about twice as far from the base of the second abdominal segment as it does in *M. lunator*, reaching as far beyond the spiracles as the distance from the base of the segment to the spiracles. On the abdomen, the black bands which border the yellow markings are continuous over the dorsum, but the yellow band on the eighth segment is not continuous. The ovipositors are relatively shorter, being only from one to one and a half times the length of the body.

The description of *M. lunator* applies to the male of *M. greeni* in all respects except those named above.

For characters distinguishing this species from others in the same genus, see list of distinguishing characters given after the description of *M. lunator*.

The dates of capture of specimens seen, range from June 2 to September 25.

The male of *M. greenei* differs from the female *greenei* in the same respects as found in *lunator*, although the color markings more closely resemble each other in the two sexes than in *lunator*. It may be distinguished from the male of *lunator* by the absence of the clouded spots in the wing.

Megarhyssa nitida (Cresson)

Rhyssa nitida Cresson, Proc. Ent. Soc. Phila., iii, p. 319, ♂.

Type.—There is one type specimen from Virginia, in the collection of the American Entomological Society of Philadelphia.

The male of this species is about half an inch long. The head is black. The antennae are dark, the scape is yellowish-white beneath, and the flagellum becomes lighter towards its tip. The mandibles are black but the palpi are yellowish-white. The clypeus is yellowish-white and this color extends upwards over the face, spreading to the compound eyes; to the base of the insertion of the antennae where it is interrupted, and sometimes to the vertex, as two yellowish-white bands margining the compound eyes. Behind the compound eyes are yellowish white bands, stopping just short of the mandibles and the vertex. The thorax is black. Beginning at the tegula a triangular shaped white band, which later becomes reduced to a line, passes forward along the upper border of the prothorax nearly to its middle line. A white streak appears just above the procoxa. The prescutum and mesonotum are black, the latter with a pair of fine longitudinal yellowish-white lines near its center. The center of the mesoscutellum has a large yellowish-white spot on it, nearly divided at its front margin by a dark one. The posterior margin of the entire plate has a narrow white line. On the metascutellum (postscutellum) is an oblong white spot. The rear margin of the plate bears a yellowish-white line. The tegulae and a raised spot beneath the fore wing are yellowish-white. The metapleurae are pale rufous. The wings are hyaline, iridescent, with fuscous nervures which are pale at their base. The stigma is fuscous except its base, which is pale. The arcolet is small and petiolated. The anterior legs are yellowish-white, on the outer side of the tibiae are slightly darker markings. The extremities of the tarsal segments are darker than their bases and the claws are dark. The middle coxae are pale rufous, the trochanters, femora, tibiae, and tarsi are yellowish-white. The tip and a spot at the base of the femora are dark. The extremities of the tarsal claws are much darker than in the anterior legs, the last four segments being almost completely dark, as are the tarsal claws. The posterior coxae are pale rufous, the trochanters are yellowish-white, with their extremities dark. The femora are rufous with a dark spot on their outer extremities. The tibiae are lighter but each has a dark spot on its extremity, and another fainter one near its base. The first two tarsal segments are yellowish-white, their tips dark, the third, fourth, and fifth are dark, the claws are rufous. The abdomen is black

and polished. On each side of the third segment is a small yellowish-white spot: similar spots are found on the remaining segments, increasing in size up to the fifth, after which they decrease.

♀ Unknown.

M. nitida may be distinguished from the rest of the *Megarhyssa* by means of its dark abdomen with the yellowish-white markings.

In all probability *M. nitida* is the male form of *M. humida* as previously stated.

Habits of Megarhyssa

The following extracts are taken from an article by C. V. Riley,⁹ because he gives the best description of the habits of *Megarhyssa*.

“ . . . In preparing for the act (oviposition) the position is generally longitudinal or in a line with the axis of the trunk or branch, the head either up or down. With the abdomen raised in the air the ovipositor is taken and managed with the hind legs, and the tip guided by the front tarsi. The two outer sheaths are used as props and do not enter the wood with the ovipositor proper. They are generally crossed—a position which gives additional strength and security to them. Now, by a movement from side to side, and by arching the abdomen and bearing upon the ovipositor she gradually forces this back through the tip of the abdomen into a membrane which issues from between the sixth and seventh joints dorsally. There is a wonderful muscular power in the anal joints, and the ovipositor is forced back until it forms a perfect coil, so that when the abdomen is stretched in a straight line to its utmost the ovipositor within the membrane makes a circle almost as large as a quarter of a dollar, the anal joint having made a three-fourths turn within the membrane. In this manner the ovipositor under the venter has been sufficiently shortened to bring its tip against the bark. During this operation, however, the outer sheaths, which have not followed the ovipositor within the membrane, have been obliged to make a more or less irregular coil opposite to and in front of the membrane on the ventral side. Now commences the operation of boring, and with the wonderful muscular power in the anal joint and the elasticity of the membrane, the insertion of the ovipositor goes on quite steadily if the wood be in the

⁹ Insect Life, i, 1888-89, p. 168.

least soft. As the borer enters, the sheaths make a larger and larger loop on one side of the body, or even a valve on each side. . . . In withdrawing the ovipositor the reverse action takes place and the loops of the outer sheaths gradually become smaller and smaller; the ovipositor is again forced back into the tough bladder-like membrane between the sixth and seventh joints dorsally and we have a repetition of the appearance."

The old idea was that the *Megarhyssa* probed a burrow with her ovipositor until she came in contact with the larva of a *Tremex*, which she pierced and deposited an egg therein. The observation has also been made that the insect is lignivorous and not parasitic. Both of these conclusions have been shown to be false. Riley quotes J. A. Lintner,¹⁰ as follows:

". . . In all instances where I have found the female depositing, it has been in trees infested with *Tremex columba*, and I have found her more numerous on badly affected or injured trees, or even on stumps or broken trunks already partly decayed. The instinct to reach the egg or larva of *Tremex*, so dwelt upon in popular accounts, is imaginary. She bores directly through the outer parts of the tree, and doubtless probes for a burrow; but her egg is consigned anywhere in the burrow; the young larva seeks its prey, and lives and develops without penetrating the body of its victim, but fastened to the exterior. This habit among parasites is much more common than is generally supposed. A great many *Rhyssa* (i. e. *Megarhyssa*) larvae doubtless perish without finding food, and a great many females die in probing for a burrow, especially when they burrow through wood that is sound and hard."

In this same paper, Riley in speaking of some personal observations, says, ". . . We examined the burrows very carefully and found *Thalassa* (i. e. *Megarhyssa*) in all stages at that time—larvae, pupae of both sexes, and imagines of both sexes within the tree—the larvae being of various sizes and invariably external to the *Tremex*: i. e. not within, but holding on to its victim and sucking the latter's life away, without in any case entering the body."

The insect remains within the tree until it becomes adult, then it gnaws its way to the surface and escapes. The males usually

¹⁰ Country Gentleman, xlix, 1884, p. 331.

appear first. W. H. Harrington¹¹ has given a series of observations made in June, 1887, in which he showed that the males having issued first, awaited the females, and were able to locate the spot at which a given female would emerge, some time before she made her appearance. In one instance which he records, a particular spot was crowded with males for two days before the female emerged, and even then, she was assisted by the removal of the bark by the observer. The males, in waiting, make every effort to reach the female, inserting the tips of their abdomen into crevices in the bark. On emerging the female is instantly seized, the legs of the male clasping the yet unused wings and abdomen, thus preventing her from flying.

Genus **RHYSSA** Gravenhorst

Rhyssa Gravenhorst, Ichneum. Europ., iii, 1829, p. 260.

Epîrhyssa Cresson, Proc. Ent. Soc. Phila., iv, 1865, p. 39.

Pararhyssa Walsh, Trans. Acad. Sci. St. Louis, v, 1873, p. 109.

Rhyssa Riley, Ins. Life, i, 1888-9, p. 169 (habits).

Rhyssa Dalla Torre, Cat. Hym., iii, 1901-2, p. 482.

Epîrhyssa Schmiedeknecht, Gen. Ins., fasc. 62, 1907, p. 59.

Rhyssa Schmiedeknecht, Gen. Ins., fasc. 62, 1907, p. 62.

Rhyssa Ramsey, The Entom., xlvii, 1914, p. 20 (habits).

Genotype: *Ichneumon persuasorius* Linn.

Rhyssa, a primitive and widespread genus, occurs both in America and Europe. In North America it is found from Alaska to Mexico and from the Pacific to the Atlantic coast, and is also found on the island of Cuba. There are two records of fossil *Rhyssae* being found, one in the Lower Miocene and the other in the Oligocene.¹² It occurs under such a variety of climates and conditions that considerable variation both in color and structural characters is found. It would seem as though it were trying to break up into a number of races and thence to species, but its variations have not become fixed to such an extent that they may be considered as permanent. *Rhyssa persuasoria*, the oldest described species of this genus, was described by Linnaeus; since there have been several new species described, in some instances from a single specimen, but the amount of variation is so great that it does not seem safe to accept as a new species, one described from a single specimen.

¹¹ Can. Ent. xix, 1887, p. 206.

¹² Scudder, Tert. Insect. t. 10, 1890, p. 19.

In 1864, Cresson described *Rhyssa albomaculata*. He separated this species from *R. persuasoria* on the grounds that the former had a white band on its antennae, a slight difference in color markings and a small petiolated areolet, but as specimens occur with white banded antennae and areolets similar to those with black antennae and vice versa, and as there is a great range in both thoracic and abdominal markings which do not adhere always to the antennal or areolet differences, it would seem that *R. albomaculata* is really *R. persuasoria*. *R. skinneri* Viereck is described from one specimen, mainly upon structural characters, with some difference in color markings, but in *R. persuasoria* there is a marked variability in structural as well as in color markings. The clypeus may range from pointed to truncate, the face may be medially elevated and smooth or striated or the whole face may be elevated. There is considerable variation in the puncturing and rugulose characters of the thorax. The notum of the propodeum may or may not have a medial-longitudinal depression. As for the differences in color it would seem that no dependence could be placed upon them, and that *Rhyssa skinneri* will probably prove to be a synonym. *Rhyssa alaskensis* was described by Ashmead from one specimen. The description of this species will apply equally well to *Rhyssa persuasoria* and it will probably prove to belong to the latter species.

Table to Species of Rhyssa

1. Face elevation longitudinally rugulose **skinneri** Viereck
2. Face elevation not longitudinally rugulose **persuasoria** Linnaeus

Rhyssa skinneri Viereck

Rhyssa skinneri Viereck, Trans. Am. Ent. Soc., xxix, 1903, p. 87, ♀.

Type.—In collection of Acad. of Nat. Sci. Phila., from Beulah, New Mexico, Aug. 17, 1901, (H. Skinner).

“Face rugulose; mesonotum almost uniformly transversely striate, the striae not apparently gibbose. Raised line separating metanotum and pleura poorly defined, being obsolete below the spiracles. Length, 23 mm., face somewhat elevated medially, the elevation rather longitudinally rugulose, sides and anterior margins of the face, polished and moderately sparsely punctured. Clypeus highly polished, distinctly produced to a point medially, and with a row of deep punctures. Cheeks polished, almost impunctate. Dorsulum transversely striate, the striae delicate but well defined posteriorly.

Carina on anterior half of mesopleura becoming indistinct half way upon the pleura, strongly striato-punctate, the superior half, highly polished. Scutellum flattened, transversely striate. Metanotum with a slight median longitudinal impression, delicately, transversely sculptured, laterally shining, rugulose; mesotapleura polished, sparsely punctured, rugulose on the superior margin. Wings hyaline, with a brown cast, nervures and stigma dark brown, second recurrent nervure interstitial with the second transverse cubitus. Dorsal abdominal segments finely transversely sculptured, having a satiny luster. Ovipositor about 29 mm. in length. Black, a line from malar space to apex of the eye, a band on the superior border of the propleurae, a spot below on the tubercle, a spot on the anterior coxae, greater part of the tegulae, a large spot beneath, a small spot on the mesopleurae, a spot on the medial coxae, a short line to the sides and apex of first, second, third, fourth, fifth and sixth, and a lateral line on the seventh dorsal segments, white. Greater part of four anterior legs (excluding coxae) ochraceous. Apex of first, all of second trochanters and the femora of posterior legs ferruginous; the tibiae and tarsi dark brown. Described from one female specimen "closely related to *R. persuasoria* but distinguished by the difference in sculpture, very distinct in coloration."

As the writer has never seen the type of this species, the original description by Viereck is here given.

***Rhyssa persuasoria* (Linnaeus)**

Ichneumon persuasoria Linnaeus, Syst. Nat., Ed. x, 1758, p. 256, n. 67.

Cryptocentrum lineolatum Kirby, Fauna Bor. Amer., iv, 1837, p. 260.

Rhyssa albomaculata Cresson, Proc. Ent. Soc. Phila., iii, 1864, p. 318.

Rhyssa (Pararhyssa) albimaculata Walsh, Trans. Acad. St. Louis, iii, 1873, p. 109.

Cryptocentrum lineolatum Kirby, Can. Ent., ix, 1877, p. 150.

Epirhyssa crevieri Provancher, Nat. Canad., xii, 1880, p. 17.

Rhyssa persuasoria Riley, Insect Life, i, 1888-89, p. 169.

Rhyssa albomaculata Hopkins, Bull. 32, West Va. Exp. Sta., 1893, p. 217.

Rhyssa persuasoria Morley, The Entomologist, xlii, 1909, p. 133, note.

Rhyssa persuasoria Morley, The Entomologist, xliii, 1910, p. 243.

Rhyssa alaskensis Ashmead, Harr. Alaska Exp., ix, 1910, p. 205.

Type.—Location unknown. Type of *Cryptocentrum lineolatum* in British Museum.

The female of this species is from about half an inch to nearly an inch in length. Its color markings are also very variable. The head is dark brown to black. In most instances the orbits of the compound eyes are white, rarely interrupted at the vertex, and extending downward as far as the clypeus on each side of the eye. In some specimens there is a white band just above the clypeus connecting the lower ends of the bands of the facial orbits, in others the lower part of the face below the antennae and above the clypeus is white. The clypeus may be pointed or vary toward truncate. Below the antennae the face may be raised centrally or entirely, and its surface may be

smooth or striated. The antennae are dark brown to black. Some are all black, some have a suggestion of white, some one or two segments that are white, while in others there may be a number of distinct, white segments forming a band on the antennae. The individuals having this last-named characteristic have been regarded by some as forming a separate species, *Rhyssa albomaculata*.

The thorax is dark brown to black. There is a variable amount of thoracic punctures and striations. The prothorax is bordered above and below with a varying amount of white. In some the sides of the prothorax have such an amount of white that the dark ground color only shows as a spot in the center. The mesonotum is immaculate. On the center of the mesoscutellum is a square white spot, and usually there is a white line on the rear margin of the entire plate. There is an oblong white spot on the center of the metascutellum (postscutellum) and this plate may or may not have its rear margin marked by a white line. The tegulae and a raised spot beneath the fore wings are always white. On the mesopleuron just below the attachment of hind wing is a white spot and another just above and in front of the middle coxae. The size of these spots is variable and they may even coalesce, margining the posterior border of the mesopleuron. There is a variable white spot on the side of the metathorax and another just above it on the propodeum. In some specimens there is a median longitudinal depression on the notum of the propodeum; in others it is suggested, while in some it is absent. The wings are hyaline sometimes tinged with yellow. The nervures and stigma are fuscous except at their base, where they are paler. The shape, size, and even the presence of the areolet are variable. The recurrent nervure is usually interstitial with the outer transverse cubital nervure. In some the latter nervure is present and assists in forming the areolet, in others but a stub of it remains while in some cases it is absent. In some cases the areolet is petiolated, receiving the recurrent nervure in its middle. The legs vary from light yellow to rufous, the coxae from white to black with white spots. In general the posterior legs are darker than the others. The color is even more variable in the legs than in the thorax. The abdomen is dark brown to black, lustrous, and finely, transversely aciculated above. The lower borders of the pleura of the second segment are each margined with a white band, which bends upward at its posterior margin and usually meets its fellow of the opposite side, above. The third segment is similarly marked except that the bands do not quite meet above. Usually on the fourth, fifth, sixth, and seventh segments these bands are interrupted so that a spot is formed on the upper side of the pleuron, while its lower border remains marked with a white band. In some, the spot and band are connected on the seventh segment. On the last segment the white marking is continuous along the posterior margin but does not meet its fellow above. This line is not always continuous. The ovipositor is slightly longer than the body, dark brown to black, with darker colored sheaths.

The male differs from the female in that the face below the antennae is whiter and the anterior coxae and femora are lighter colored.

I have not seen the type of *Rhyssa skinneri* Viereck, as already stated, but from the description, it does not seem impossible that it may be a form of this species.

Habits of Rhyssa

The Rhyssae by means of their ovipositors bore into trees infested with borers and there deposit their eggs. They are primary parasites on *Sirex*, *Monohammus* and *Urocerus cyaneus*. As their life from hatching to adult is spent within the trunks of trees, it has made a study of their history practically impossible. It has been generally assumed that they were external parasites, but H. J. Erne¹³ gives an account of raising *Rhyssa* from *Sirex*. According to him the eggs were laid within the larvae. It has been clearly shown that in the closely related genus *Megarhyssa*, the eggs are external to the larvae. The tip of the ovipositor is constructed for sawing into wood and not for piercing other insects. It does not seem probable that the members of one genus live as external while those of so similar a genus should live as internal parasites. Yet the only published evidence that has been found asserts that *Rhyssa* live as internal parasites. Erne's observations will be given here though their accuracy is doubted.

"In studying *Serropalpus* I had an opportunity to observe *Pimpla persuasoria*. The eggs of *Pimpla* were usually laid in the larva of a species of *Sirex*, which were very inactive on that account, and did not put up any resistance. After they hatched the little larva remained in the *Sirex* larva until the latter died. The larva of *Pimpla* had by this time attained a size of two or three lines.

"They left the *Sirex* larva after it was dead, and from time to time fed on the remains. If the *Sirex* larva is large the *Pimpla* larva has food enough, but if it is small, the food supply is not sufficient, and since the *Pimpla* does not try any other nourishment it dies in the wood. Frequently the *Sirex* larva with the parasite larva in its body, penetrates deeply into the wood, so that the developed *Pimpla* has to bite its way out of the wood from a depth of two lines in order to get free. For a space of three days it thus works itself forward; if it does not get free in three days its strength becomes weakened and it dies in the

¹³ Mittheil. Schweiz. Entom. Gesell., iv, 1876, p. 9, p. 518.

wood. If one would rear the larva of a *Pimpla persuasoria*, one must give it the remains of the same larva for nourishment in which it was hatched."

Riley says¹⁴ that Ratzburg states that both Nordlinger and himself raised *Rhyssa persuasoria* from *Sirex spectrum*, but does not give any details of his observations nor does he state that the parasite in ovipositing pierces the wood-boring grub.

The subject of the habits of *Rhyssa* is by no means a clear one, and it awaits some worker who will be fortunate enough to observe its complete life history.

The genus *Rhyssa* Gravenhorst, has its clypeus medially lengthened or unidentate and its abdominal segments rounded at the apices. The sternal plate of the second abdominal segment is not fused with the pleura. The projections of the sternal plates on either side of the mid-ventral groove are placed about mid-way between the base and apex of each segment. The sternal plate of the second abdominal segment is composed almost wholly of chitin. The ovipositors of *Rhyssa* are but little longer than the body, consequently they do not need the membrane which is used by *Megarhyssa* in forcing its long ovipositor into the wood.

Since the above was written an article has appeared on the habits of oviposition by *Rhyssa* by L. N. G. Ramsay,¹⁵ as follows:

"The remarkable insects of the genus *Rhyssa* have for long been known to prey on the wood-boring larvae of *Sirecidae*, introducing their eggs into the tunnels of the latter by means of their enormously elongated ovipositor. The ovipositor is sometimes even found sticking in a *Sirex*-infested log (as, for example, the specimens exhibited in the insect gallery at South Kensington), but, I understand, the manner in which the insect contrives to insert this unwieldy appliance into the tree-trunk has not hitherto been fully described. I hope, therefore, that the following account may be of interest to entomologists.

"The event described was witnessed in the summer of 1909, while I was staying in the southern part of the Black Forest, to the west of the Wehratal. On the afternoon of August 29th,

¹⁴ Insect Life, i, 1888-89, p. 169.

¹⁵ The Entomologist, xlvii, p. 20, f. 14, (1914).

while skirting a wood—the very finest conifers of the Black Forest flourish in this locality—I happened to pause beside a pile of small pine logs, and as I stood there one of these extraordinary insects appeared and settled on one of the logs. I will quote verbatim from my notes written the same day:—‘It sat still for some time, and then began to walk about, feeling every hole and (p. 21) corner in the rough bark with its long antennae. After a minute or two of this it stopped, and drew up its long body, doubling the long black ovipositor underneath itself; it had to hitch itself up several times before it got the long needle into position underneath, with the tip in a crevice. Then it gripped the bark with its claws and gradually thrust the ovipositor about half an inch into the bark, then suddenly flew away, perhaps because it had completed laying the eggs, perhaps because I had gone too close. . . .’

“Immediately after, I made the rough sketches of the beast which accompany this note. These are probably a little larger than life, although the insect was a very large one. I noted that the abdomen was black and white, the legs pale, and the antennae black.

“At the time I was unaware of the insect’s identity, but on seeing the specimens of *Rhyssa* exhibited at the Natural History Museum this year, I at once recognized my old acquaintance, and comparison of the other species of the genus in the cabinet collections there leaves little, if any doubt, that this was *R. persuasoria*.

“The figures will help to indicate the manner in which the insect succeeded in bringing its unwieldy ovipositor to bear on the log. As mentioned above, these were drawn before I left the spot (with the exception of the second, which I have added now to make the action clearer), and they are reproduced without any change from my original rough drawings. As the insect had already taken its departure, they are necessarily crude, as it was the only example of its kind on which I had ever set eyes. For this and for their obvious artistic defects I shall make no further apology, as they are merely intended to convey the manner in which the insect accomplished its object.”

Sharp¹⁶ figures (after Riley) the allied genus *Thalessa* (now

¹⁶ Cambridge Natural History, Insects, pt. i, p. 554, 1895.

Megarhyssa) in the act of oviposition, and states that in both these genera the ovipositor is "brought into use by being bent on itself over the back of the insect, so as to bring the tip vertically down onto the wood, through which it is then forced by a series of efforts; the sheaths do not enter the wood."

It is evident that this description does not tally with the foregoing observations on *Rhyssa*. The insect figured by Sharp follows his statements in having its long ovipositor bent on itself, out of its normal and approximately straight form, into an almost complete circle. From purely physical considerations, is it not a little difficult to understand how a non-muscular structure could be curved at will in this way? The possibility suggests itself to the present writer that the insect there figured, after having inserted its ovipositor in the manner described in this note for *Rhyssa*, may have pivoted its body through an angle of 180° around the flexible fixed ovipositor, in its efforts to thrust the latter into an unusually resistant piece of wood. This might easily happen through the insect's shifting its feet again and again to obtain a better purchase, and would explain the whole matter very simply, as the ovipositor in such a case would naturally assume the position figured.

There can be no doubt at all that Mr. Ramsay's notes refer to *R. persuasoria* (Linnaeus), which has an extremely wide distribution through Europe to Canada and the United States in the West, and the Himalayas in the East, since it is to the best of my knowledge the only species attacking phytophagous larvae. *R. approximator* (Fabricius), is said by Holmgren to attack *Xyphydria prolongata*, which feeds in oaks; and there are several interesting accounts of the American species' economy¹⁷ and Harrington has¹⁸ put on record "The Nuptials of *Thalessa*." Mr. Ramsay appears to take it for granted that these insects bore for themselves an egg-passage through the solid wood; but it is by no means proved that they do not oftener introduce them along the tunnel of the host larva.¹⁹

¹⁷ Canad. Entom., xi, 1879, p. 15 etc.

¹⁸ L. c. xix, p. 206.

¹⁹ Cf. Morley, Ichn. Brit., iii, p. 25, and Revision Ichn. Brit. Mus. ii, p. 10

Genus **APECHONEURA** Kreichbaumer

Apechoneura Kreichbaumer, Ann. Naturh. Mus. Wien, v, 1890, p. 485.

Apechoneura Schmiedeknecht, Genera Insectorum, Fasc. 62, 1907, p. 60.

Apechoneura Morley, Rev. Ichneumon Brit. Mus., ii, 1913, pp. 3, 22, 23.

Genotype: *Rhyssa terminalis* Brullé.

The head is square with a distinct carina between the antennae. The antennae are long and filiform. The mesonotum is transversely rugose. The propodeum is distinctly areolated anteriorly, but posteriorly is less distinctly so. The transverse median nervure is straight, not broken. The sub-discoidal nervure originates from the median vein far beyond the apex of the sub-median cell. The areolet in the fore-wing is trapezoidal or three cornered, sessile, or shortly petiolated. The abdomen is long and cylindrical, with an ovipositor as long or longer than the body. The largest species usually have a dark spot in the tip of the wing.

Table to Species

This table is taken from Morley's Revision of Ichneumonidae, Part II. The types of these two species are in the British Museum, and therefore Mr. Morley has had an opportunity to examine them. Not having seen Moesary's paper²⁰ I am unable to include his species.

Abdomen with only a discal line black.....**nigritarsis** Cameron
Abdomen black and flavous, not at all red.....**carinifrons** Cameron

Apechoneura nigritarsis (Cameron)

Rhyssa nigritarsis Cameron, Biol. Cent.-Am., Hymen., i, 1886, p. 260, ♀.

Rhyssa nigritarsis Schmiedeknecht, Gen. Ins., Fasc. 62, 1907, p. 63.

Apechoneura nigritarsis Morley, Rev. Ichneumon., ii, 1913, p. 23.

Type.—In the British Museum.

"Fulvo testacea; antennis, mesonoto (medio-excepto), linea metanoti, abdomine, supra tarsisque, nigris; alis hyaline, apice fumata. Habitat, Panama, Volcan de Chiriqui at 2000–4000 ft.

"Length 22 mm. Antennae nearly as long as the body, stout, gradually thickened towards the apex; the base testaceous on the lower side. Head, if anything, broader than the mesothorax, the face strongly punctured, the clypeus obscurely, transversely, striated, with two deep shining black depressions above the antennae, separated by a thin, rather sharp partition, vertex punctured in front, laterally behind the ocelli aciculated; mandibles black

²⁰ Ann. Mus. Nat. Hungar., iii, 1905.

at the apex. Pronotum reaching to near the top of the head, rising rather perpendicularly in front; the mesonotum projects a little over it, and rises from the scutellum to the apex, which has a distinct margin; the margin projects upward in the center and is depressed in the middle. Mesonotum transversely striated as usual and with a longitudinal furrow on each side of the apical three-fourths, scutellum shining, obscurely punctured, broader than long, slightly narrower towards the apex. Pleurae shining, obscurely punctured, a longish longitudinal hollow in the middle. The mesonotum is black except laterally in front and down the center. Scutellum testaceous, the sutures black. There is a longish black mark under the fore-wings; the base and apex of the metanotum, and a broad line down its center are black. The longish curved spiracles are bordered with black. Metanotum shining, impunctate, a curved transverse keel runs across its center and an oblique one from the spiracles to the apex. Abdomen shining, somewhat compressed, black above, the apex pilose, in the center of the penultimate segment is a somewhat triangular depression, covered with a white membrane; the last segment above forms a projecting thickly pilose lobe; on the lower side it projects more and ends in two horny processes which clasp the ovipositor. Ovipositor nearly three times longer than the body, white at the apex. Legs shining, the hind coxae black at the base on the lower side. Areolet large, triangular, receiving the recurrent nervure in the middle." Original description from Cameron.

Apechoneura carinifrons (Cameron)

Rhyssa carinifrons Cameron. Biol. Cent.-Am., Hymen., i, 1886, p. 261, ♀ ♂.

Apechoneura carinifrons Schmiedeknecht, Gen. Ins., Fase. 62, 1907, p. 60.

Apechoneura carinifrons Morley, Rev. Ichneumon., ii, 1913, p. 24.

Type.—In the British Museum.

"Testacea, nigro varia, antennis nigris, medio apiceque subtus testaceis; pedibus rufo-testaceis; basis et apice coxarum posticarum, apice femorum, dimidio apicali tibiatarum posticarum tarsisque, nigris; alis hyaline, apice fumato. Habitat, Nicaragua.

"Antennae as long as the body, the base, the middle narrowly and the apex (except the extreme point), testaceous on the lower side. Face transversely punctured, the vertex impunctate, a distinct keel (separating the antennal depression) runs down from the ocelli to a little below the base of the antennae; eyes margined, especially on the inner side and above; testaceous, the mandibles, the antennal depressions, a broad transverse band on the vertex enclosing the ocelli and the hind region, black. Thorax formed as in *nigritarsis*, testaceous; the mesonotum (except a broad mark on the center), the sutures, the base of the metanotum broadly, the sides of the prothorax in front, a large mark on the mesopleura, and the metapleura close to the sternum, black. In the center of the metanotum two short keels run from the transverse keel, forming a somewhat square area. Abdomen black; the ventral surface, a longish mark at the base of the first segment in the center, its apex and the apices of the other segments broadly testaceous. The middle coxae are black

beneath, the hind coxae are black on the lower side at the base and bear a longer black mark on the apex above, on the inner side they are entirely black except a small testaceous spot; the hind femora are infuscate toward the apex, and more than the apical half of the hind tibiae is black, tarsi black, testaceous in the middle. What appears to be the male from Panama differs from the specimens from Nicaragua in having a broad white band on the antennae close to the apex and the yellow on the head and legs brighter in tint; there is no black on the coxae nor are the hind femora infuscate toward the apex; the black on the hind is only on the outer side; and the abdomen is broadly dilated laterally at the apex."

This species was originally described by Cameron as *Rhyssa carinifrons* but in the *Genera Insectorum* it is placed in *Apecho-neura*, probably on account of the carina between the antennae and its areolated propodeum.

Genus **PSEUDORHYSSA** new genus

Genotype: *Pseudorhyssa sternata* new species.

This genus is characterized by its abdominal sterna being entire instead of being separated by a median longitudinal groove. It has an areolated propodeum consisting of three areas. The nota of the second and third abdominal segments are laterally bordered with a ridge forming a depression, which is not found in the other Pimplini genera which have the transversely rugose mesonotum. There is no carina between the antennae.

Pseudorhyssa sternata new species

Type: ♀; Toronto, Ontario, Canada. August 20, 1892. Collection of the American Entomological Society. Type No. 4007.

Six paratypes in same collection.

The females of this species range from three-quarters of an inch up to an inch and a quarter in length. The head is black, polished, and slightly punctured. The clypeus varies in outline from unidentate to bidentate. Below the antennae the face is brown marked by two parallel longitudinal yellow bands, which extend from the base of the antennae to the clypeus. On the base of each mandible is a yellow spot. The clypeus is rufous at its base and darker at its tip. The palpi are yellowish-white marked with black. The antennae are dark brown to black, and the scape has a yellow spot beneath. The thorax is black and bears a number of short, erect, whitish hairs. The pronotum is deeply excavated on both sides, highly polished and almost impunctate. The first thoracic spiracle is bordered with yellow and this color may extend forward for a short distance on the upper border of the pronotum. The tegulae are yellow. The mesonotum is flat on top and is separated from the presutum, only by two short parallel longitudinal grooves along its anterior portion. Posteriorly the presutum is continuous with the

mesonotum, the transverse rugulae of the latter passing over the former in a continuous line. The anterior portion of the prescutum is punctured.

The mesopleura are smooth, polished on their superior portions, punctured and clothed with short white hairs on their inferior portions. A short groove extends forward on the mesopleura from the mesoepimeron, starting at a point about two-thirds of the distance from its base to its apex. The mesoscutellum and metascutellum are smooth on their sides, with oblique to longitudinal striations, their centers are punctured and clothed with hairs. The metathorax is smooth, slightly punctured and clothed with short, white hairs. The propodeum is coarsely punctured, except for a dorsal area enclosed by ridges, which is polished and but slightly punctured. These ridges start at, or near the base of the segment, pass posteriorly, as two gradually diverging straight lines for about two-thirds its length, where they become circularly dilated to such an extent, that at their posterior extremities they reach to the lateral margins of the notum, thus forming three areolated areas on the propodeum. The wings are hyaline, tinged with yellow, the nervures and stigma are dark brown except at their base, where they are lighter. The recurrent nervure is interstitial with the outer transverse cubitus. The legs are rufous, paler beneath. The tarsal segments are sometimes darker towards the tarsal claws, which are also dark. The posterior femora each have a dark spot on its extremity. The posterior tarsi are darker than the others. The abdomen is coarsely punctured and irregularly wrinkled. The notum of the second abdominal segment is laterally bordered with a strong ridge. From each anterior extremity of the notum extends a ridge to its apex. These ridges gradually converge and enclose a median longitudinal channel, which at its base is polished and impunctate but becomes coarsely punctured and irregularly wrinkled. From this depression a number of transverse wrinkles extend to the lateral margins of the notum. The pleura of this segment are coarsely punctured and do not fuse with the notum. There is a small obtusely rounded projection on the outer margin of the segment at the point where the ridges end. This projection is bordered by a rufous streak. The notum of the third segment has transversely wrinkled, oblique depressions extending from either side of the projecting lobe of the second segment outward to the lateral margin of the notum. The rest of the notum is coarsely punctured and irregularly wrinkled, except a raised portion at the truncate, outer margin which is finely punctured. The sternal plates are not divided by a median longitudinal groove, consequently there are no mid-ventral projections. This segment, as are also the fourth, fifth, and sixth, is bordered with a rufous band. The remaining segments are coarsely punctured and irregularly wrinkled on their nota. The fifth, sixth, seventh and eighth segments have truncate outer margins laterally, with slight emarginations on their nota. The ovipositor is longer than the body, dark brown but lighter at its tip, with darker colored sheaths.

This species is described from seven specimens, one each from "Maine," "Colorado" and "Toronto, Canada," and four from "Washington Territory." It may be distinguished from *Meqar-*

hyssa, *Rhyssa*, and *Epirhyssa* by its entire abdominal sterna, areolated propodeum, and by the excavations on the nota of the second and third abdominal segments, and may be distinguished from *Apechoneura* by the absence of a carina between its antennae.

Unlocated Species

Thalessa ? histrio Kriechbaumer

Thalessa? histrio Kriechbaumer, Ann. Naturh. Hof-Mus., Wien., v, p. 487, ♂.

"Head, thorax, and feet black, varied with rufo-flavous, abdomen rufous, base black segments 1 and 2 banded, 3 on both sides, apical spots flavous. Wings hyaline, stigma flavous, this sunken triangular spot and apex of the wings fuscous, areola wanting. Length, 13 mm. Because of the absence of the areola perhaps forming a proper genus, which I have omitted to establish since the female as yet unknown might fail to show the very imperfect characteristic marks. Head flavous, apex of mandibles, eyes, occipital bands beneath on both sides reddish, ocellar region, the line on the vertex joined with it, and antennae black, of this the first two segments beneath, the upper line and two facial sutures rufous. Thorax black, nearly the whole margin of the anterior pleura, pronotum, two longitudinal striae and two punctures before the mesonotum, striae below the wings, tegulae, scutellum, postscutellum, three lateral metathoracic spots, tip of dorsum near place of junction, slightly golden-yellow. Nearly the whole of the anterior coxae, the posterior above and on the sides flavous, summit angulated and below fuscous, anterior trochanter flavous, dark punctured, posterior ones fuscous, top flavous or rufous, hind part more or less fulvous, in front flavous, above rufous, banded, on both sides, posteriorly below fuscous lined, posterior rufous, top flavous, anterior tibiae and tarsi flavous, posterior rufous, base of exterior radial nervure of wing irregularly bent. Forceps on the last anal segment short on top, summit triangularly greatly impressed, segments straight. Ends of segments abruptly truncated.

Habitat: White Mountains."

EXPLANATION OF PLATES

Plate XII

Fig. 1.—Antenna of *Megarhyssa lunator*.

Fig. 2.—Maxilla of *Megarhyssa lunator*.

C—cardo. G—galea. L—lacinia. P—palpus. S—stipes.

Fig. 3.—Head of *Megarhyssa lunator*.

CE—compound eye. CL—clypeus. GE—gena. L—labrum. MD—mandible.

Fig. 4.—Mandible of *Megarhyssa lunator*.

Fig. 5.—Dorsal view of thorax of *Megarhyssa lunator*.

Fig. 6.—Lateral view of thorax of *Megarhyssa lunator*.

a2—second abdominal segment. cx1—procoxa. cx2—meso-coxa. cx3—metacoxa. epm2—mesoepimeron. epm3—metaepimeron. eps1—proepisternum. eps2—mesoepisternum. eps3—metaepisternum. n1—pronotum. ppct2—prepectus. psc2—preseutum. sp—spiracle. scl2—mesoscutellum. scl3—metascutellum. set2—mesoseutum. set3—metaseutum. tg—tegula. tsp—thoracic spiracle.

Plate XIII

Fig. 1.—Abdomen of *Megarhyssa lunator*.

Fig. 2.—Sternal plate of abdomen of *Megarhyssa*.

Fig. 3.—Sternal plate of abdomen of *Rhyssa*.

Fig. 4.—Second abdominal segment of *Rhyssa*.

Fig. 5.—Second abdominal segment of *Megarhyssa*.

Fig. 6.—Hind leg of *Megarhyssa lunator*.

Fig. 7.—Fore leg of *Megarhyssa lunator*.

Plate XIV

Fig. 1.—Fore wing of *Megarhyssa lunator* according to Snodgrass.

1—costal vein. 2—sub-costal vein. 3—radial vein. 4—median or externo-median vein. 5—anal, sub-median or interno-median vein. 7—basal vein. 9—cubital vein. 11—transverse cubital vein. 12—transverse cubital vein. 13—transverse medial vein. 14—discoidal vein. 15—subdiscoidal vein. 16—first recurrent vein. 17—second recurrent vein. 19—stigma.

Fig. 2.—Fore wing of *Megarhyssa lunator* according to Cresson.

a—costal and sub-costal nervures blended. b—externo-medial nervure. c—anal nervure. d—basal nervure. e—marginal or radial nervure. f—first transverse cubital nervure. g—second transverse cubital nervure. h—transverse medial nervure. i—abbreviated cubital or stump of nervure. j—discoidal nervure. k—cubital nervure. l—recurrent nervure. m—subdiscoidal nervure. n—stigma.

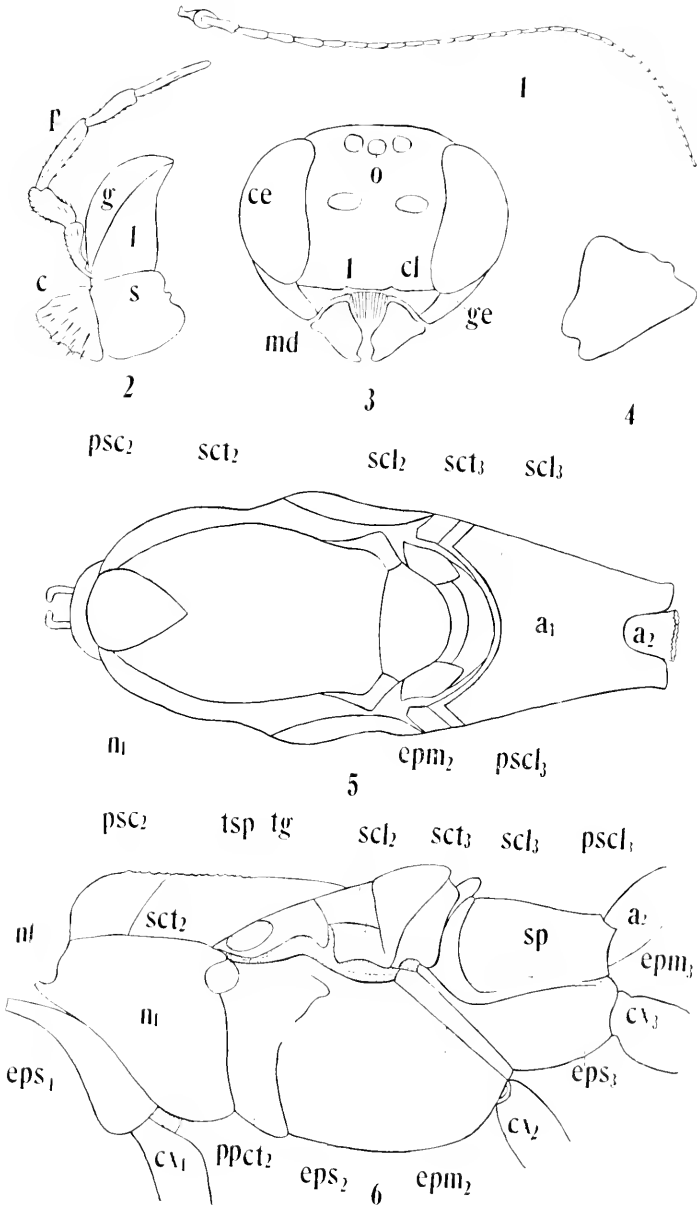
Fig. 3.—Hind wing of *Megarhyssa lunator*.

a—costal nervure. b—sub-costal nervure. c—externo-medial nervure.
d—anal nervure. e—marginal or radial nervure. g—discoidal nervure.
h—transverse medial nervure. i—transverse cubital nervure.

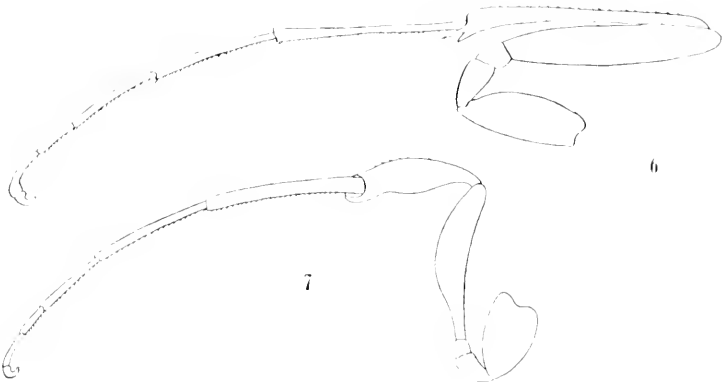
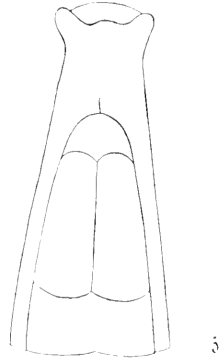
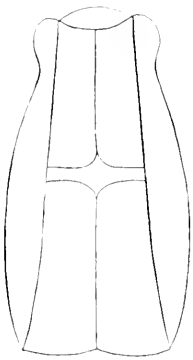
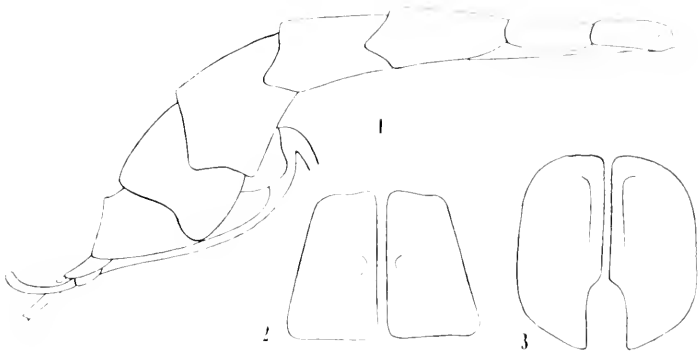
Fig. 4—Fore wing of *Megarhyssa lunator*.

Fig. 5—Hind wing of *Megarhyssa lunator*.

a—anal. c—costa. d—cu. cubitus. r—radius. sc—sub-costa. m—
medius.

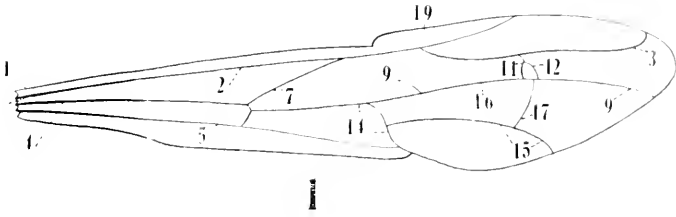


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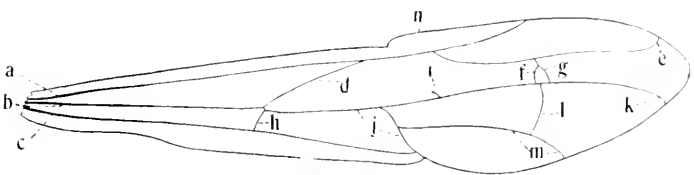


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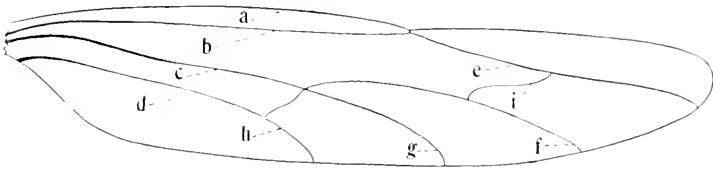




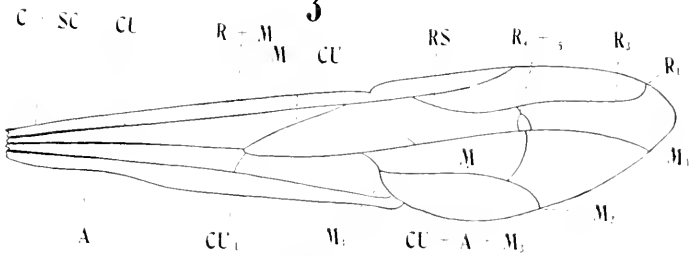
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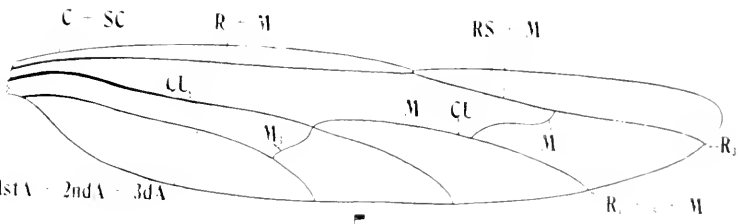
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STUDIES IN AMERICAN TETTIGONIIDAE
(ORTHOPTERA)

V

BY JAMES A. G. REHN AND MORGAN HEBARD

A SYNOPSIS OF THE SPECIES OF THE GENUS
CONOCEPHALUS (XIPHIDIUM OF AUTHORS)
FOUND IN NORTH AMERICA NORTH OF
MEXICO¹

CONOCEPHALUS Thunberg

1815. *Conocephalus* Thunberg, Mém. Acad. Imp. Sci. St. Petersbourg, v, p. 271.
1829. *Anisoptera* Latreille, Règne Anim., Ed. 2, v, p. 184.
1831. *Xiphidium* Serville, Ann. Sci. Nat., xxii, p. 159.
1838. *Xiphidium* Burmeister, Handb. Entom., ii, abth. ii, pt. i, p. 707.
1869. *Palotta* F. Walker, Cat. Dermapt. Salt. Brit. Mus., ii, p. 249.
1912. *Conocephalus* Karny, Gen. Ins., Orth., Subf. Conocephalinae, p. 8.

GENOTYPE (by tautonymy).—*Conocephalus hemipterus* Thunberg = *Conocephalus conocephalus* [*Locusta conocephalus*] (Fabricius).

This genus is a member of the Tettigoniidae and of the subfamily Conocephalinae, and has been placed by Karny at the end of his restricted subfamily Conocephalinae, after the very closely allied genus *Orchelimum*. It is evident, however, that the North American genus *Odontoxiphidium* should be placed at the end of this group, following the present genus.

It is extremely important to note that the many subgenera of *Conocephalus* are readily separable one from the other by one or more striking characters in every instance, while the genus *Orchelimum*, though forming a distinct unit which is readily recognizable in the vast majority of specimens examined, affords no single constant character for its ready separation from the present genus.

¹ Published with the aid of the Orthoptera Fund.

Differential Generic Characters.—The genus *Conocephalus* is separated with great difficulty from the genus *Orchelimum*. The present genus includes diminutive forms; but the smallest individuals of several species of *Orchelimum*, the majority of these found only in the extreme northern part of the range of the respective species, are not as large as the largest specimens of *Conocephalus* before us. In the present genus the stridulating field of the male tegmen is normally smaller, narrower and less extensive than in *Orchelimum*, the vicinity of the arcuate vein not strongly produced or overhanging² and, when looking from the dorsum, the humeral trunk is never hidden.³ The male cerci, though showing many different types, do not in any of the North American species exhibit the type found in the majority of the species of *Orchelimum*, in which the tooth is placed in a more or less decided socket-like depression; all of the American species of the genus have the cerci unispinose. Further usual differences are found in the male subgenital plate which is truncate distad in the great majority of American species.⁴ The females of all the North American species do not have the ovipositor decidedly arcuate, though distinctly arcuate in *C. nemoralis*, occasionally of this type in *C. nigropleuroides*, and such a condition even more weakly indicated in other species.⁵ Material of the two genera is easily separated by a decidedly different general appearance, but when the characters of the two are compared, the variation in each of the genera leaves us unable to state a single absolute difference.

History.—In 1815, Thunberg erected the genus *Conocephalus*, including in it twenty-four species; under one of these, *C. hemipterus* (p. 272), he placed as a synonym *Locusta conocephalus* of Fabricius, which citation forms, under the International Nomenclature rules, type designation by tautonymy, and in consequence

²The opposite of this is true for the majority of, but not all, the species of *Orchelimum*.

³This is the normal condition in the species of *Orchelimum*, excepting in *O. volantum* and *O. bradleyi*, and to a less degree in *O. gladiator*.

⁴This is not true of *C. allardi*, which has a distinctive and remarkable male subgenital plate.

⁵In *Orchelimum*, *militare* is the only species having a straight ovipositor; several other species have the ovipositor with dorsal margin straight but with ventral margin curved.

the species becomes type of the genus *Conocephalus*. This unfortunate condition has been remarked by certain authors in recent years, and requires the abandonment of the name *Conocephalus* for the large cone-headed katydids to which it has generally been applied, and its use for the present genus, which appears in most literature under *Xiphidium* or *Xiphidium*.

The name *Anisoptera* of Latreille, 1829, was based on two species, *dorsalis* and *brachypterus*; the former has been selected as the type of *Anisoptera* by Kirby,⁶ the latter is a member of the Decticinae. Karny⁷ takes exception to the use of *Anisoptera* for the present genus by Kirby; the latter's non-use of *Conocephalus* is apparently incomprehensible to him, but is probably due to Kirby's personal objection to the use of tautonymic names, which objection has been shared by numerous workers.

Walker's genus *Palotta*, 1869, includes the single species *inornata*, which has been synonymized by Kirby under *Xiphidium iris* of Stal.

Classification.—Karny has recently divided the present genus into five subgenera.⁸ His new *Noxiphidium* includes thirty-two species and in the absence of a designated genotype we select *C. (N.) fasciatus* (DeGeer). The subgenus *Xiphidium* Serville has the type fixed by Kirby⁹ as *fuscum* (Fabricius). Karny's new *Thecoxiphidium* includes six species and, in the absence of a designated genotype, we select *C. (T.) strictus* (Scudder). The subgenus *Palotta* F. Walker has *inornata (iris* Serville) type by monotypy, while the type of the subgenus *Conocephalus* is *C. (C.) conocephalus* by tautonymy, as discussed above. Of these subgenera we find *Xiphidium*, *Palotta* and *Conocephalus* possessing sufficient and distinguishable characters, but under *Xiphidium* we must place *Noxiphidium* and *Thecoxiphidium*. The first of these is separated by Karny by the male cerci being heavy, depressed and short distad, the majority of species American, in contrast to *Xiphidium* having the male cerci slender, acuminate, not or but little depressed distad, the majority of species from the Eastern Hemisphere. Study of the genotypes and the numerous species of the

⁶ Syn. Cat. Orth., ii, p. 274, (1906).

⁷ Verh. k.-k. zool.-botan. Gesell. Wien, lix, p. 27, (1909).

⁸ Gen. Ins., Orth., Subf. Conocephalinae, p. 8, (1912).

⁹ Syn. Cat. Orth., ii, p. 274, (1906).

genus before us convinces us that the above characters are insufficient. Moreover we are certain that the type species of these subgenera, *fasciatus* and *fuscus*, possess no other differential characters of sufficient importance to warrant the erection of subgenera. The North American species which we place under the subgenus *Xiphidion* are naturally separated into three groups, but it would be necessary to erect countless subgenera for the genus were these considered subgenerically distinct. The Old World species having no teeth, or two, instead of the usual one on each male cereus, are certainly more distinctive than these and may constitute valid subgenera, while the variation, within the genus, of the male subgenital plate affords even more decided genital characters, being acutely produced distad without styles in some, acutely produced distad with styles in others and not produced but bearing styles in the majority of species.

The very long ovipositor and very brief tegmina are used to separate *Thecoxiphidion* from *Xiphidion*. The variation in the ovipositor, not only in the type of this subgenus but in the majority of the species which we have studied, convinces us that this character is insufficient for subgeneric use, and the tegminal length is not to be considered of even specific value, as the genotype itself, normally decidedly brachypterous, develops a macrop-terous form.

Key to the Subgenera of the Genus Conocephalus

A. Prosternum bispinose. (Caudal tibiae armed at distal extremity with three pairs of spurs.)

B. Ventral margins of cephalic and median tibiae armed with five to seven¹⁰ well spaced spines.

C. Male subgenital plate very strongly produced meso-distad in two sharp straight spikes, styles absent.

Dicellura new subgenus

CC. Male subgenital plate with distal margin more or less decidedly truncate, with no decided emargination or production; small, slender, filiform styles present laterad.

Xiphidion Serville

BB. Ventral margins of cephalic and median tibiae armed with nine to ten closely set spines.

Palotta F. Walker

AA. Prosternum unarmed. (Ventral margins of cephalic and median tibiae armed with five to seven¹⁰ well spaced spines.)

¹⁰ In all of the North American species of the genus, the cephalic and median tibiae have both ventro-cephalic and ventro-caudal margins armed uniformly with six well spaced spines.

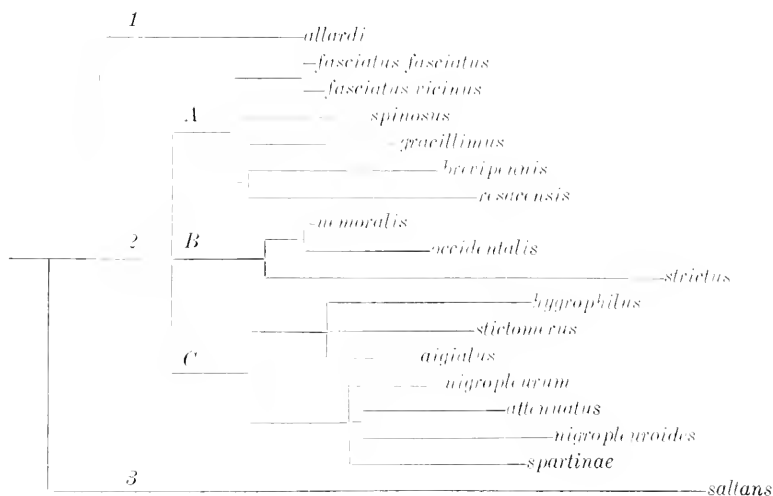
B. Caudal tibiae armed at distal extremity with three pairs of spurs.

Conocephalus Thunberg

BB. Caudal tibiae armed at distal extremity with a single pair of spurs (dorsal and ventral pairs absent. Male subgenital plate as in *Xiphidion*.)

Anarthropus new subgenus

The following diagram illustrates the relationship of the forms here considered.



The numbers given above designate the three subgenera known from North America; the letters indicate the natural groups of the very large subgenus *Xiphidion*, each of which includes species showing a greater or less degree of affinity, as given in the above diagram. Of the species of group A, *resacensis* shows much the greatest affinity to the species of group C. Group B is distinctive and forms a decided unit, not a transition, between groups A and C. Group C divides into two portions, the species forming the first of these showing somewhat greater affinity to those of Group A.

In certain respects otherwise very different species show decided similarity, thus *allardi* and *nemoralis* both have unusually broad tegmina with apices very broadly rounded and tympana of males in proportion decidedly wider than is usual; *brevipennis*

and *spartiuae* are so similar in general appearance that they long remained unrecognized in collections as very distinct species.

Distribution (over the region under consideration).—The present genus is found everywhere in Canada as far north as adequate collecting has been done and probably extends in distribution northward at least as far as the spruce belt. It is also found everywhere in the United States; but in the semi-desert and desert regions of the west it is confined to mountains, rivers, streams, lakes and irrigated tracts where a more constant water supply is to be found. The genus is found in the greatest numbers in the Mississippi Valley region and in the central Atlantic states.

Material Examined.—In addition to a series of over 1000 specimens already correctly recorded, we have examined and recorded in the present paper 2907 specimens, of which 1924 are in the Hebard Collection and that of the Academy of Natural Sciences of Philadelphia. For the privilege of studying the additional material we wish to express our deep appreciation to Mr. A. N. Caudell, of the United States National Museum and to Dr. Samuel Henshaw, of the Museum of Comparative Zoology, who have enabled us to study all of the material in the collections of those institutions, to Prof. A. P. Morse who has generously requested us to study and record the interesting series in his collection taken by him outside of New England, and to Mr. Wm. T. Davis and Dr. J. Chester Bradley whose careful work in the field and kind cooperation has greatly assisted us in this and other studies. The privilege of studying and recording the material belonging to the Pennsylvania State Department of Zoology has also aided us in the present work.

In the preparation of the present paper the following types have been before us:

Conocephalus allardi (Caudell)

Conocephalus fasciatus vicinus (Morse)

(*Xiphidium vicinum* var. *productum* Morse, synonym of *Conocephalus fasciatus vicinus* (Morse).)

Conocephalus spinosus (Morse)

Conocephalus gracillimus (Morse)

Conocephalus brevipennis (Scudder)

(*Xiphidium ensifer* Scudder, synonym of *Conocephalus brevipennis* (Scudder).)

(*Xiphidium gossypii* Scudder, synonym of *Conocephalus bicri-*
pennis (Scudder).)

Conocephalus resacensis new species

Conocephalus nemoralis (Scudder)

Conocephalus occidentalis (Morse)

(*Xiphidium occidentale* var. *camurum* Morse, synonym of
Conocephalus occidentalis (Morse).)

(*Xiphidium occidentale* var. *caudatum* Morse, synonym of
Conocephalus occidentalis (Morse).)

Conocephalus strictus (Scudder)

Conocephalus hygrophilus new species

Conocephalus stictomerus new species

Conocephalus aigialus new species

Conocephalus nigropleurum (Bruner)

Conocephalus attenuatus (Scudder)

Conocephalus nigropleuroides (H. Fox)

Conocephalus spartinae (H. Fox)

Conocephalus saltans (Scudder)

(*Xiphidium modestum* Bruner, synonym of *Conocephalus sal-*
tans (Scudder).)

Key to Males of the North American Species of the Genus
Conocephalus found north of Mexico

A. Prosternum bispinose. Caudal tibiae armed at distal extremity with three pairs of spurs.

B. Subgenital plate very strongly produced meso-distad in two sharp straight spikes which are weakly divergent, styles absent, distal margin of plate between productions obtuse-angulate emarginate.

(Subgenus **Dicellura**)

(Size medium, form robust. Vertex very weakly ascending, sides moderately divergent, greatest width two-thirds that of proximal antennal joint. Eyes normal. Convex callosity of lateral lobes very broad. Tegmina broad at apex, tympanum of same unusually large. Dorsum of abdomen, including cerci, dark brown. Cerci heavy, with mesal portion not contrastingly swollen, armed with a heavy mesal (vertical) tooth which is flat and broad at the base, situated interno-mesad. Ventral margins of caudal femora unarmed.)

allardi (Caudell)

BB. Subgenital plate not produced distad, disto-lateral styles small and filiform, distal margin of plate nearly or quite transverse.

(Subgenus **Xiphidium**)

C. Cerci armed with a heavy mesal (vertical) tooth, so that its base is visible from above, this tooth situated interno-mesad.

D. Cerci with mesal portion not contrastingly swollen.

E. Cerci with distal portion weakly to very decidedly depressed and with apex broad and rounded. (Size small to medium.)

F. Tympanum of tegmina not unusually elongate. Convex callosity of lateral lobes not very broad. Vertex moderately produced, (weakly to very weakly ascending).

G. Cerci with distal portion moderately produced, the depression of the same being general and not more decided on the internal side.

II. Vertex with sides moderately divergent, greatest width about two-thirds that of proximal antennal point. Eyes decidedly small. Convex callosity of lateral lobes moderately but not decidedly broad. Dorsum of abdomen trifasciate, with median line broad. Cerci not decidedly heavy or elongate, with distal portion weakly depressed. Ventral margins of caudal femora normally unarmed.

I. Form slender. Abdominal fasciae moderately distinct, colors not brilliant. **fasciatus fasciatus** (DeGeer)

II. Form moderately slender. Abdominal fasciae very distinct, colors brilliant (particularly so in life).

fasciatus vicinus (Morse)

III. Vertex with sides decidedly divergent, greatest width equalling that of proximal antennal joint. Eyes normal. Convex callosity of lateral lobes very narrow. Abdomen immaculate, with distal portion, including cerci, pale yellow. Cerci heavy, elongate, with distal portion very decidedly depressed. Ventro-external margins of caudal femora bearing normally four to five spines. (Form moderately robust.)

spinus (Morse)

GG. Cerci with distal portion more decidedly produced and very strongly depressed, particularly on the internal side. (Form moderately slender. Vertex with sides moderately divergent, greatest width two-thirds that of proximal antennal joint. Eyes normal. Convex callosity of lateral lobes moderately but not decidedly broad. Dorsum of abdomen dark brown, in pale examples yellowish. Ventral margins of caudal femora normally unarmed.)

brevipennis (Seudder)

FF. Tympanum of tegmina unusually elongate. Convex callosity of lateral lobes very broad. Vertex distinctly produced. (Form very slender. Vertex weakly ascending, sides moderately divergent, greatest width about two-thirds that of proximal antennal joint. Eyes normal. Dorsum of abdomen narrowly but usually strikingly trifasciate. Cerci of similar type to those of *fasciatus* but distinctly more elongate and attenuate, with distal portion very strongly depressed. Ventral margins of caudal femora unarmed.)

gracillimus (Morse)

EE. Cerci with distal portion not at all or very weakly depressed, with apex narrow, acuminate. (Eyes normal. Ventral margins of caudal femora unarmed.)

F. Vertex broad and blunt, very weakly ascending, sides strongly divergent. Size medium to slightly smaller.

G. Form distinctly robust. Vertex with greatest width slightly greater than that of proximal antennal joint.¹¹ Convex callosity of lateral lobes moderately broad. General color dark brown, occasionally washed with green, veins and veinlets of tegmina pale and conspicuous. Tegmina broad at apex, tympanum of same unusually large. Cerci short, distal portion short, conical, with blunt apex not at all depressed. **nemoralis** (Scudder)

GG. Form moderately robust. Vertex with greatest width averaging about one and three-fourths times that of proximal antennal joint which is unusually small. Convex callosity of lateral lobes very broad. General color dark brown or bright green, abdomen uniformly dark or very dark meso-dorsal with a dark line on each side, veins of tegmina not conspicuous. Tegmina not broad at apex, tympanum of same unusually small. Cerci similar to those of *nemoralis* but with distal portion more produced, elongate, attenuate, almost imperceptibly or not at all depressed, with apex more acuminate.

occidentalis (Morse)

FF. Vertex very broad and exceedingly blunt, not at all ascending, sides very strongly divergent, (greatest width about one and one-half times that of proximal antennal joint). Size large to very large. (Form robust. Convex callosity of lateral lobes very broad. Dorsum of abdomen infuscated except in very pale examples. Tegmina broad at apex. Cerci of same general type as those of *nemoralis* but with distal portion very greatly produced, very elongate and attenuate, very weakly depressed distad, with apex strongly acuminate.)

strictus (Scudder)

DD. Cerci with mesal portion very contrastingly swollen, (this portion elongate ovate, distal portion moderately produced and very weakly depressed, apex sharply rounded. Size rather large, form distinctly attenuate. Vertex not ascending, sides strongly divergent, greatest width slightly greater than that of proximal antennal joint. Eyes normal. Lateral lobes of pronotum very broad, convex callosity of same very broad. Abdomen immaculate, with distal portion, including cerci, pale yellow. Ventral margins of caudal femora unarmed.)

resacensis new species

¹¹ One male of *C. nemoralis* is before us having the vertex unusually narrow, not as wide as the basal antennal joint. Though this character is of decided importance in the species of the present genus, the above instance shows that, no matter how constant a single character may appear to be, occasional specimens are sure to be found in which the variation from the normal is decided.

CC. Cerci armed with a more delicate (ventral) tooth, so that but little of this tooth is visible from above, (mesal portion of cercus very contrastingly swollen), tooth situated at proximal base of this swelling, (distal portion of cercus greatly depressed. Vertex distinctly ascending).

D. Cerci with swollen mesal portion not attenuate elongate. (Eyes unusually protuberant. Abdomen immaculate, with distal portion, including cerci, a bright and striking yellow in life.)

E. Swollen mesal portion of cerci with that portion above tooth produced in an overhanging knob-like protuberance, distal portion strongly produced with sides very weakly converging to broadly rounded apex.

F. Vertex with sides strongly divergent, greatest width equalling that of proximal antennal joint. Convex callosity of lateral lobes of pronotum broad. Cerci with swollen mesal portion bulbous, ovate. Coloration not unusual. Size large, form robust and rather elongate. Eyes large. Ventro-external margins of caudal femora bearing two to four spines. **hygrophilus** new species

FF. Vertex with sides very weakly divergent, greatest width little more than half that of proximal antennal joint. Convex callosity of lateral lobes of pronotum very narrow. Cerci with swollen mesal portion brief, so that entire distal half of cercus is flattened. Coloration unusual.¹² Size rather large, form rather slender, Eyes normal. Ventro-external margins of caudal femora bearing normally three and three spines. **stictomerus** new species

EE. Cerci with swollen mesal portion not produced above tooth, (this portion nearly circular), distal portion less strongly produced with margins strongly converging to sharply rounded apex. (Vertex with sides moderately divergent, greatest width about two-thirds that of proximal antennal joint. Convex callosity of lateral lobes broad. Size medium, form robust and rather truncate. Eyes large. Ventro-external margins of caudal femora bearing normally four and five spines.) **aigialus** new species

DD. Cerci with swollen mesal portion attenuate, elongate ovate, (distal portion with margins subparallel to broadly rounded apex.)

E. Vertex with greatest width very little over one-half that of proximal antennal joint. Eyes of normal size but unusually protuberant.

F. Coloration solid, distinctive and vivid, abdomen solid shining black, with meso-dorsal portion occasionally very dark brown. (Cerci heavy, with swollen mesal portion broadly elongate ovate. Size medium, form moderately robust. Convex callosity of lateral lobes very narrow but distinct. Ventro-external margins of caudal femora bearing normally three and three spines.)

nigropleurum (Bruner)

FF. Coloration of head and pronotum trifasciate, abdomen not solid shining black. (Size small to medium, form distinctly slender.)

¹² The caudal femora are in life strikingly marked with spots and dots of coral red.

G. Coloration not as brilliant. Convex callosity of lateral lobes very narrow and subobsolete. Cerci of similar type to those of *nigropleurum* but longer though but little more slender, with distal portion curved outward. Ventro-external margins of caudal femora bearing normally two and two spines.

attenuatus (Seudder)

GG. Coloration very brilliant. Convex callosity of lateral lobes moderately but not decidedly broad. Cerci of similar type to those of *nigropleurum* but much more slender, with enlarged portion and distal portion both more attenuate, slightly irregular in outline. Ventro-external margins of caudal femora in much more than half of the examples unarmed, when spines are present these range from one to two.

nigropleuroides (H. Fox)

EE. Vertex with greatest width two-thirds that of proximal antennal joint. Eyes normal. (Coloration not striking, resembling that of *aigialus* but with the yellow less extensive and decidedly paler. Convex callosity of lateral lobes moderately but not decidedly broad. Size small, form moderately slender. Male cerci similar to those of *nigropleuroides* but not irregular in outline. Ventro-external margins of caudal femora bearing normally one and two spines.)

spartinae (H. Fox)

AA. Prosternum unarmed. Caudal tibiae armed at distal extremity with one pair of spurs.

(Subgenus **Anarthropus**)

(Size medium to very small, form rather slender. Vertex moderately ascending, sides decidedly divergent, greatest width nearly one and one-half times that of proximal antennal joint. Eyes normal. Convex callosity of lateral lobes very broad. Abdomen with dorsum dark, bordered laterad with a narrow pale line, sides infuscated. Cerci very slender, with a long, slender, median (vertical) tooth situated interno-mesad, the diameter of which at its base is nearly that of diameter there of shaft of cercus. Ventral margins of caudal femora unarmed.)

saltans (Seudder)

It must be remembered in using the above key that single characters are seldom if ever absolutely constant and that variation exists in all species, the characters given above, when taken singly, being only correct for the great majority and not for every example of the species considered.

In every group we have carefully studied, the absolute necessity of determining material not from one or two apparently striking differences but from the sum total of characters, has convinced us that, for correct conceptions and accurate determinations, the latter method is the only safe one to follow. In consequence a brief key for the species treated here would in our opinion only lead to confusion, and in the use of the present key we feel that

success depends upon following each species out in each character and basing conclusions upon the net result. Should single characters be taken as all important, confusion is an almost certain result.

We give below in tabular form the extremes, found in the species in tegminal and ovipositor length (in millimeters), and have also included the general form of the ovipositor and the results obtained from counting the spines of the ventro-external margins of the caudal femora. The ventro-internal margins of the caudal femora are furnished with one to two spines in but five specimens, two of *C. fasciatus fasciatus* and three of *C. attenuatus*, in the very large series examined.

	Tegmina		Ovipositor	Spines of ventro-external margins of caudal femora
	Macropterous	Brachypterous		
<i>allardi</i> *	♂	6.7-6.8	straight.	none.
	♀	5.3-5.4	15.3-16.8	.....
<i>f. fasciatus</i>	♂	11.7-19.3	straight.	normally 0.
	♀	10-21.1	7-9.9	12.5% 1 to 3.
<i>f. vicinus</i>	♂	16.4-18.7	straight.	normally 0.
	♀	15.6-18.5	7.5-13	4% 1 to 2.
<i>spinosus</i> *	♂	14.3-15.1	very weakly curved, broader.	normally 4 and 5. extremes 4 to 6.
	♀	16.2	7-8.8	
<i>gracillimus</i>	♂	14.4-19.1	straight.	none.
	♀	15.3-20.7	7.8-10.9	.....
<i>brevipennis</i>	♂	13.9-16.3	straight or nearly straight.	normally 0.
	♀	14.9-18.1	5.4-9.3	23% 1 to 5.
<i>resacensis</i> *	♂	7.1-8.8	straight.	none.
	♀	5.6-6	15.2-15.6	.....
<i>nemorialis</i>	♂	7.2-9.2	distinctly curved.	none.
	♀	15.7-16.7	4.3-7.7	.....
<i>occidentalis</i>	♂	7-9.4	very weakly curved to nearly straight.	none.
	♀	16.4	4.3-6.9	.....
<i>strictus</i>	♂	15.7-17.8	5.1-7.3	nearly straight. none.
	♀	15.4-22 ¹³	2.8-5.8	17.7-32.3
<i>hygrophilus</i>	♂	10.3	weakly sigmoid, broader.	normally 2 and 3. extremes 2 to 4.
	♀	18.6	10.4	

¹³ A single female from Appomattox, Virginia, exhibits an intermediate condition between the brachypterous and macropterous forms of the present species; tegminal length 10.5 mm.

		Tegmina		Ovipositor	Stimulus of caudal terminalia
		Macropterous	Brachypterous		
<i>stictomerus</i>	♂	18.3-18.4	8-11.6	very weakly sigmoid, broader.	normally 3 and 4 extremes 0 to 7.
	♀	18.3-18.8	6.9-9.8	13.7-19.8	
<i>aigialus</i>	♂	16-17.7	6.8-9.6	straight to weakly sigmoid, broader.	normally 4 and 5, extremes 1 to 7.
	♀	18.1-19.7	7.1-10.6	10.6-13.7	
<i>nigropleurum</i>	♂	.....	5.7-9.4	straight, broader.	normally 3 and 3, extremes 0 to 6.
	♀	16-18.6	6.6-9.3	13.4-18.7	
<i>attenuatus</i>	♂	18.1	10.1-10.6	very weakly curved.	normally 2 and 2, extremes 0 to 5.
	♀	19.4-20.9	8.7-10.6	19.9-27.8	
<i>nigropleuroides</i>	♂	.....	5.7-8.7	weakly sigmoid or distinctly curved.	considerably over half 0.
	♀	15.5-17.8	5.3-8.2	curved.	extremes 0 to 2.
<i>spartinae</i>	♂	15.3-18.2	5.9-9.3	very weakly curved.	normally 1 and 2, extremes 0 to 5.
	♀	16.2-18.9	5.2-9.3	7.1-9.9	
<i>saltans</i>	♂	14.3-17.1	3.1-6.3	very weakly curved to nearly straight.	none.
	♀	16.2-20.3	1.6-3.8	9.7-16.4	.....

In the species marked with an asterisk greater extremes doubtless exist, as adequate material for such determination is not as yet contained in collections. The macropterous forms have the wings decidedly surpassing the tegmina, the brachypterous forms have the tegmina as long as, or longer, than the wings. Such macropterism and brachypterism is found in twelve of the seventeen species here considered. No such brachypterous form is developed in *fasciatus vicinus*; a semi-brachypterous form being the normal condition in this race, and macropterism appearing in the southernmost portions of its distribution. Three species—not including the above mentioned geographic race of one of these—show only a macropterous condition, while two species are known from only brachypterous material. So little material is known of one of the only macropterous and both of the only brachypterous species, that both conditions will very probably be found in one or possibly all of these species when larger series have been gathered. Of the twelve species showing

both conditions, the normal type is brachypterous in all of which we have sufficient material to reach any conclusion; two of these, *stictomerus* and *spartinae*, alone show a macropterous type apparently in preponderance in portions of their southernmost distribution.

The ovipositor length is taken from the base of the basal plica to the apex of the ovipositor, it has been a general practice to take this length from the juncture of the subgenital plate to the apex of the ovipositor, but due to the mobility of the subgenital plate this method can not be as accurate. In consequence our measurements average about .4 mm. less than they would if taken the other way.

The spines of the ventro-external margins of the caudal femora, when present in *fasciatus fasciatus*, *fasciatus vicinus* and *brevipennis*, are almost invariably decidedly smaller than in the species in which such spines are normally present.

The genicular lobes of the caudal femora are always unispinose in *occidentalis*, *strictus* and *saltans*, normally so in *nemoralis* and apparently so in *allardi* and *resacensis*; in all of the other species they are normally bispinose. A single abnormal specimen of *spartinae* has one of these genicular lobes trispinose. The variability of this character in the majority of species causes it to be of little diagnostic importance.

The abdominal coloration is important, particularly in the males of the species of this genus. Some forms are distinctive in coloration and these factors are discussed in the specific treatment. Many species are similar in having head, pronotum, thorax and limbs green, with a dark medio-dorsal stripe on head and pronotum usually narrowly bordered by buff. In the specific treatment of such species, it has not been considered necessary to discuss these features unless specific variations occur.

As the present work is considered by no means monographic, we have thought it best to omit detailed descriptions under the treatment of all but the new species. The most important characters are given in the keys and tables of the introduction. In the following treatment of the known species, we have more fully discussed these characters where further details of interest exist, and have also considered other less important characters which have been omitted from the keys and tables of the intro-

duction. As a result, in determining material with the present paper, we would advise the use primarily of the keys, tables and figures; the specific treatment of known species being here employed mainly to set forth the variation in each species and its distribution.

Subgenus **Dicellura**¹⁴ new subgenus

The subgenus includes a single species, from the Appalachian region of the southeastern United States.

Type of Subgenus.—*Conocephalus allardi* [*Xiphidium allardi*] (Caudell).

Subgeneric Description.—Prosternum bispinose. Subgenital plate of male very strongly produced meso-distad in two sharp straight spikes which are weakly divergent, styles absent; between the productions the distal margin of the plate is obtuse-angulate emarginate at an angle of slightly over ninety degrees. Ventral margins of cephalic and median femora armed with six well spaced spines. Caudal tibiae armed at distal extremities with three pairs of spurs. Size medium for the genus, form robust.

Conocephalus allardi (Caudell) (Pls. XV–XVII, fig. 1; XVIII, 1 and 2; XIX, 9; XX, 1.)

1910. *Xiphidium allardi* Caudell,¹⁵ Ent. News, xxi, p. 58. [Tray and Blue Mountains, Towns County, Georgia.]

The present insect is widely separated from any other known species of the genus by the characters given in the subgeneric description. The species bears a slight superficial resemblance to *C. brevipennis* but differs greatly in the characters mentioned above, in the very broad tegmina of which the male tympanum is unusually large for the species of the genus, and in the ovipositor which is rigidly straight and exceeds in length the maximum found in *brevipennis*. The anomalous male subgenital plate brings to mind that of the South American species, *C. vitticollis* and *C. longipes*, but this plate is found upon examination to be an entirely different development in the present insect.

¹⁴ From *δίκελλα*=fork and *οὐρά*=tail, in allusion to the exceptional form of the male subgenital plate.

¹⁵ Single type designated by Caudell and Hebard, Proc. Acad. Nat. Sci. Phila., 1912, p. 164, (1912).

Lateral lobes of pronotum decidedly broad, cephalic margin moderately oblique and nearly straight to the broadly obtuse-angulate ventro-cephalic angle, thence nearly straight and decidedly more horizontal than is usual to the rather sharply rounded ventro-caudal angle which is rectangulate, caudal margin weakly sinuate but nearly straight, humeral sinus obsolete, convex callosity very broad. Tegmina broadly rounded at apex. Genicular lobes of caudal femora normally unispinose, sometimes supplied with a small supplementary spine; genicular areas of same darkened; ventral margins of caudal femora unarmed.

In addition to the type series (the type and allotype in the United States National Museum and a paratypic pair in the Hebard Collection), we have examined but two unrecorded specimens. The species is further known only from specimens taken by Allard at Indian Grave Gap, Towns County, Georgia.

Wytheville, Virginia, IX, 5, 1903, (Morse), 1 ♂, [Morse Cln.].

Rabun County, Georgia, VII, 1910, (W. T. Davis), 1 juv. ♀, [Davis Cln.].

Subgenus **Xiphidion** Serville¹⁶

1912. *Xiphidion* Karny, Gen. Ins., Fasc. 135, Subf. Conocephalinae, p. 8.

1912. *Neoxiphidion* Karny, ibid.

1912. *Thecoxiphidion* Karny, ibid.

Conocephalus fasciatus fasciatus (DeGeer)¹⁷ (Pl. XV, figs. 2, 3 and 5; XVI and XVII, 2; XVIII, 3 and 4; XIX, 10; XX, 2.)

1773. *Locusta fasciata* DeGeer, Mém. Hist. Ins., iii, p. 458, pl. 40, fig. 4. [Pen(n)sylvania.]

1841. *Orchelimum gracile* Harris, Ins. Inj. Veget., p. 131. [Massachusetts.]

Harris' description of his *gracile*, giving a nearly straight ovipositor and other characters, shows unquestionably the present synonymy; the figure of a female accompanying the same description in the Flint edition¹⁸ belongs, however, to an *Orchelimum*, probably *concinnum* Scudder, the curved ovipositor showing at once that the specimen selected for the figure by Dr. Agassiz was not the species described by Harris.

The present species is not, as has been generally supposed, found far south of the borders of the United States, and the only exotic material of the species now before us is from Bermuda.

¹⁶ See page 157 for the type of this subgenus and the synonymy.

¹⁷ For a more descriptive discussion of the present species see following study by Rehn and Hebard, Trans. Am. Ent. Soc., xli, (1915).

¹⁸ Harris, Ins. Inj. Veget., Flint Ed., p. 163, fig. 78, (1862).

The Antillean records and those from Panama apply to a closely allied but distinct species *C. cinereus*, while those from Mexico may be in part correct, as the present species certainly inhabits the northern portion of that country; the South American records, however, belong either to the above mentioned or still another species.

The tegmina normally surpass the tips of the caudal femora when in repose; no brachypterous condition exists in this insect and only very occasional specimens have the tegmina barely reaching the extremities of the caudal femora. This latter condition is found only in rare specimens from northern localities and in western series approaching *C. f. vicinus*.

The male cerci in the present species are usually bright green; in drying some specimens, as in the other species of the genus, lose all of their normal green general coloration, becoming a uniform straw color. The genicular areas of the caudal femora are not darkened; the genicular lobes of the same are normally bispinose; the ventro-external margins of the caudal femora are normally unarmed, very small (usually microscopic) spines are present in two hundred and eight perfect specimens examined as follows:

Number of spines,	0-0	0-1	1-1	1-2	2-2
Number of specimens,	182	19	5	1	1

This shows 12.5% of the material to have these margins armed, geographic distribution apparently having no effect on this condition in the present species. In the specimen having the ventro-external margins of the caudal femora armed with 2 and 2 spines, one of the ventro-internal margins is also furnished with a single minute spine, this is also found in a single specimen having the ventro-external margins unarmed.

The ovipositor length is as follows: Bothwell, Prince Edward Island, 8-9.2; Northeast Harbor, Maine, 7-7.8; Fredericksburg, Virginia, 8-9.3; Jacksonville, Florida, 7.3-8.3; West Point, Nebraska, 9.2-9.6; Pinebluff, Wyoming, 8.3-9.9; Carrizo Springs, Texas, 8.6-9.7; Jemez Hot Springs, New Mexico,¹⁹ 8.6-9.1 mm.

The present species is found in the United States from the Atlantic to the Pacific, the typical form being supplanted by a

¹⁹ These specimens are intermediate between the eastern and western races of this species.

geographic race in the region of Pacific drainage. The insect will probably be found to occur in Canada far north of its present known range (Prince Edward Island to North Bay and White-mouth, Ontario, to Aweme, Manitoba) as it is a hardy species even more abundant in the meadows of northern Maine and Michigan than in the south and E. M. Walker states that it is "one of the few common locustids in northern Ontario." Southward it is found to the extremity of southern Florida and along the gulf coast to Mexico.

Specimens Examined: Previously recorded, over 300. Here recorded, 698; 339 males, 355 females and 4 immature females. Intermediates, 20; 7 males, 11 females and 2 immature females.

Bothwell, Prince Edward Island, VIII, 24, 1912, (B. Long), 4 ♂, 7 ♀, [A. N. S. P.].

St. Andrews, Prince Edward Island, VIII, 26, 1912, (B. Long), 1 ♂, 2 ♀, [A. N. S. P.].

Dundee, Prince Edward Island, VIII, 26, 1912, (B. Long; in black spruce swamp), 1 ♀, [A. N. S. P.].

Charlottetown, Prince Edward Island, IX, 1912, (B. Long), 1 ♀, [A. N. S. P.].

Bunbury, Prince Edward Island, VIII, 28, 1912, (B. Long; in marsh), 5 ♀, [A. N. S. P.].

Cape Aylesbury, Prince Edward Island, VIII, 27, 1912, (B. Long; among sand dunes), 2 ♀, [A. N. S. P.].

Great Cranberry Island, Maine, VIII, 24, 1913, (H.: occasional in short grasses), 1 ♀.

Northeast Harbor, Maine, VIII, 16 and 21, 1913, (H.: common in short grasses), 5 ♀.

Baileys Island, Casco Bay, Maine, VIII, 25, 1907, (B. Long), 3 ♀, [A. N. S. P.].

Rye Beach, New Hampshire, IX, 1 and 2, 1913, (H.), 1 ♂.

Marion, Massachusetts, VIII, 1905, (H.), 1 ♂.

Amherst, Massachusetts, X, 1907, (J. A. Hyslop), 1 ♀, [U. S. N. M.].

Wesquage Beach, Rhode Island, IX, 8 and 10, 1913, (H.; grasses near salt marsh), 4 ♂, 2 ♀.

Chateaugay Lake, New York, VIII, 20 to IX, 11, 1878, (Scudder), 1 ♂, 3 ♀, [M. C. Z.].

Clifton Springs, New York, 5 ♂, 7 ♀, [Cornell Univ.].

Ithaca, New York, VIII, 1 to X, 4, 1885 to 1894, 13 ♂, 5 ♀, [Cornell Univ.].

Cattaraugus, New York, IX, 11, 1894, 1 ♀, [Cornell Univ.].

Tobyhanna, Pennsylvania, IX, 1903, (H.), 2 ♂.

Stroudsburg, Pennsylvania, IX, 1903, (H.), 1 ♂.

Cornwells, Pennsylvania, IX, 11, 1906, (R. & H.), 1 ♀.

Tinicum Island, Pennsylvania, IX, 9 and 29, 1903 and 1904, (R. & H.), 1 ♂, 1 ♀.

Swarthmore, Pennsylvania, X, 13, 1906, (E. T. Cresson Jr.), 2 ♀, [A. N. S. P.].

Pink Hill, Delaware County, Pennsylvania, VII, 9, 1908. R. & H.; grasses on serpentine outcrop, 1 ♂.

Harrisburg, Pennsylvania, VII, 20 to VIII, 30, 5 ♂, 3 ♀, [Pa. St. Dept. Zool.].

Rockville, Pennsylvania, VII, 4 to 29, 8 ♂, 11 ♀, [Pa. St. Dept. Zool.].

Camphill, Cumberland County, Pennsylvania, VII, 31, 1 ♂, [Pa. St. Dept. Zool.].

Beatty, Pennsylvania, (C. Brugger), 2 ♂, 2 ♀, [A. N. S. P.].

Mullica River flats, Burlington County, New Jersey, VIII, 24, 1914. (H.; border of marsh), 1 ♂, 1 ♀.

Chestnut Neck, Atlantic County, New Jersey, VII, 16, 1911. R. & H.; grasses near salt marsh, 1 ♂.

Ventnor, New Jersey, VIII, 5, 1914. H.; among weeds in marshy spots on barrier beach, 2 ♂, 2 ♀, 1 juv. ♀.

Margate City, New Jersey, VII, 24, 1914. H.; 1 juv. ♀; VIII, 17, 1914. H.; salt marsh border, 1 ♀.

Ocean City, New Jersey, VIII, 14, 1914. H.; grasses beside road, in middle of salt marsh, 1 ♂.

Cedar Springs, New Jersey, VIII, 14, 1914. H.; common in grasses near fresh marsh, 1 ♂.

Cape May, New Jersey, VII, 22, 1910. H.; 1 ♂, 2 ♀.

Chestertown, Maryland, VII, 10 to 30, 1899 to 1904. (E. G. Vanatta), 3 ♂, 3 ♀, [A. N. S. P.].

Island Creek, Maryland, VII, 20, 1912. (C. R. Shoemaker), 1 ♂, [U. S. N. M.].

Washington, District of Columbia, 1 ♀, [U. S. N. M.].

Fredericksburg, Virginia, VII, 20, 1913. R. & H.; common in meadowland, 9 ♂, 7 ♀.

Virginia Beach, Virginia, VII, 4, 1903. (Morse), 1 ♂, [Morse Cln.].

Norfolk, Virginia, IX, 8, 1903. (Morse), 2 ♂, 5 ♀, [Morse Cln.].

Hickory, Virginia, VII, 3, 1903. (Morse), 9 ♂, 10 ♀, [Morse Cln.].

Appomattox, Virginia, IX, 6, 1903. (Morse), 1 ♂, 3 ♀, [Morse Cln.].

Wytheville, Virginia, IX, 5, 1903. (Morse), 1 ♂, [Morse Cln.].

Eure, North Carolina, VII, 5, 1903. (Morse), 2 ♂, 2 ♀, [Morse Cln.].

Selma, North Carolina, VII, 7, 1903. (Morse), 1 ♂, 1 ♀, [Morse Cln.].

Winter Park, North Carolina, IX, 7, 1911. R. & H.; occasional in weeds and undergrowth, 1 ♀.

Lake Waccamaw, North Carolina, IX, 8, 1911. R. & H.; occasional in high weeds, 2 ♂.

Greensboro, North Carolina, VII, 10, 1903. (Morse), 3 ♂, 1 ♀, [Morse Cln.].

Salisbury, North Carolina, VII, 11, 1903. (Morse), 7 ♂, 4 ♀, [Morse Cln.].

Roan Mountain, North Carolina, VIII, 31, 1903. (Morse), 3 ♂, 3 ♀, [Morse Cln.].

Linville, North Carolina, VIII, 30, 1903. (Morse), 8 ♂, 12 ♀, [Morse Cln.].

Morganton, North Carolina, VII, 12, 1903. (Morse), 3 ♂, 3 ♀, [Morse Cln.].

Balsam, North Carolina, VIII, 20, 1903. (Morse), 1 ♂, [Morse Cln.].

Governors Island, North Carolina, VIII, 20, 1903. (Morse), 1 ♂, [Morse Cln.].

- Topton, North Carolina, VIII, 21, 1903, (Morse), 1 ♂, [Morse Cln.].
 Denmark, South Carolina, VIII, 14, 1903, (Morse), 1 ♂, [Morse Cln.].
 Yemassee, South Carolina, IX, 4, 1911, (R. & H.), 2 ♂.
 Trenton, Georgia, VII, 10, 1905, (Morse), 4 ♂, [Morse Cln.].
 Marietta, Georgia, VII, 27, 1903, (Morse), 8 ♂, 2 ♀, [Morse Cln.].
 Atlanta, Georgia, VII, 26, 1910, 1 ♀, [Ga. State Cln.]; VIII, 2, 1913, (R. & H.), 1 ♂, 2 ♀.
 Augusta, Georgia, VII, 29, 1913, (R. & H.), 1 ♀.
 Savannah, Georgia, VIII, 13, 1903, (Morse), 1 ♀, [Morse Cln.].
 Tybee Island, Georgia, VIII, 12, 1903, (Morse), 3 ♂, [Morse Cln.].
 Isle of Hope, Georgia, IX, 3, 1911, (R. & H.), 1 ♂.
 Jesup, Georgia, IX, 1, 1911, (R. & H.), 1 ♂.
 St. Simon's Island, Georgia, VIII, 30, 1911, (R. & H.), 1 ♀.
 Brunswick, Georgia, VIII, 30, 1911, (H.), 1 ♀.
 Cumberland Island, Georgia, VIII, 31, 1911, (R. & H.), 3 ♂.
 Waycross, Georgia, VIII, 11, 1903, (Morse), 2 ♂, 1 ♀, [Morse Cln.].
 Billy's Island, Okefenokee Swamp, Georgia, VI and VII, 1912, (J. C. Bradley), 2 ♂, 6 ♀, [Cornell Univ.].
 Macon, Georgia, VII, 30 and 31, 1913, (R. & H.; in high grasses on edge of forest), 1 ♂, 3 ♀; IX, 18, 1878, (in pasture), 2 ♀, [U. S. N. M.].
 Westpoint, Georgia, VII, 30, 1903, (Morse), 1 ♀, [Morse Cln.].
 Columbus, Georgia, VII, 16, 1913, (J. C. Bradley), 1 ♂, 3 ♀, [Ga. State Cln.].
 Albany, Georgia, VIII, 1, 1913, (R. & H.; very few in wet grass), 1 ♂.
 Bainbridge, Georgia, IX and X, 1910, (J. C. Bradley), 1 ♂, 2 ♀, [Ga. State Cln.].
 Jacksonville, Florida, XI, 3, 1911, (W. T. Davis), 2 ♂, 3 ♀, [Davis Cln.].
 South Jacksonville, Florida, IX, 27 and 28, 1911, (W. T. Davis), 1 ♂, 2 ♀, [Davis Cln.].
 Atlantic Beach, Florida, VIII, 24, 1911, (R. & H.; in sandy field of low grass.), 2 ♀.
 Pablo Beach, Florida, IX, 27, 1913, XI, 4, 1911, (W. T. Davis), 1 ♂, 1 ♀, [Davis Cln.].
 Live Oak, Florida, VIII, 10, 1903, (Morse), 1 ♂, [Morse Cln.]; VIII, 26, 1911, (R. & H.), 1 ♂.
 Tallahassee, Florida, VIII, 8, 1903, (Morse), 9 ♂, 2 ♀, [Morse Cln.].
 Marianna, Florida, VIII, 7, 1903, (Morse), 1 ♂, 2 ♀, [Morse Cln.].
 Cedar Keys, Florida, VI, 3, 1 ♀, [U. S. N. M.].
 Tampa, Florida, XI, 23, 1911, (G. P. Englehardt), 1 ♀, [Bklyn. Inst. A. & S.].
 Little River, Florida, XI, 25, 1912, (F. Knab), 1 ♀, [U. S. N. M.].
 Lemon City, Florida, (E. J. Brown), 1 ♀, [U. S. N. M.].
 Miami, Florida, XI, 26, 1912, (F. Knab), 1 ♀, [U. S. N. M.].
 North Bay, Ontario, IX, 1 to 8, 1906, (G. S. Miller Jr.), 3 ♂, 6 ♀, [M. C. Z.].
 Cuyahoga Falls, Ohio, VIII, 14, 1904, (W. V. Werner), 1 ♂, [U. S. N. M.].
 Salineville, Ohio, IX, 10, 1892, 1 ♂, [Cornell Univ.].
 Brulé, Wisconsin, VIII, 16 and 17, 1912, (Witmer Stone), 1 ♂, 2 ♀, [A. N. S. P.].

- Cranmoor, Wisconsin, X, 17, 1910. (C. W. Hooker), 2 ♀, [U. S. N. M., Chicago, Illinois, IX, 9, 1903. (H.; in waste field), 1 ♂, 1 ♀.
 Waldo, Minnesota, VIII, 1906. (Witmer Stone), 1 ♀, [A. N. S. P., Duluth, Minnesota, VIII, 1906 and 1912. (Witmer Stone), 3 ♂, 7 ♀, [A. N. S. P.,
 Staples, Minnesota, VII, 21, 1909. (H.), 3 ♂, 1 ♀, 1 juv. ♀.
 St. Peter, Minnesota, 1880, 1 ♀, [U. S. N. M.,
 Johnson City, Tennessee, VIII, 27, 1903. (Morse), 1 ♀, [Morse Cln.,
 Chattanooga, Tennessee, X, 19, 1888. (F. G. Martin), 1 ♂, 1 ♀, [U. S. N. M.];
 2 ♂, [Hebard Cln.,
 Columbia, Tennessee, 1 ♂, [Hebard Cln.,
 Anniston, Alabama, VII, 12, 1905. (Morse), 3 ♂, 2 ♀, [Morse Cln.,
 Tuscaloosa, Alabama, VII, 15, 1905. (Morse), 3 ♂, 1 ♀, [Morse Cln.,
 Greenville, Alabama, VII, 31, 1903. (Morse), 6 ♂, 3 ♀, [Morse Cln.,
 Flomaton, Alabama, VIII, 2, 1903. (Morse), 2 ♂, 3 ♀, [Morse Cln.,
 Agricultural College, Mississippi, 1 ♂, [Hebard Cln.,
 Meridian, Mississippi, VII, 16, 1905. (Morse), 1 ♀, [Morse Cln.,
 Hattiesburg, Mississippi, VII, 17, 1905. (Morse), 1 ♂, [Morse Cln.,
 Gulfport, Mississippi, VII, 21, 1905. (Morse), 3 ♂, [Morse Cln.,
 Natchez, Mississippi, V, 14, 1909. (E. S. Tucker), 1 ♂, [U. S. N. M.,
 Fort Dodge, Iowa, VIII, 27, 1910. (M. P. Somes), 1 ♀, [Hebard Cln.,
 Iowa City, Iowa, VIII, 5, 1910. (M. P. Somes), 1 ♀, [Hebard Cln.,
 St. Louis, Missouri, VII, 24, 1877, 1 ♂, [U. S. N. M.,
 Kirkwood, Missouri, X, 1877, 1 ♂, 3 ♀, [U. S. N. M.,
 Fayetteville, Arkansas, IX, 5, 1905. (Morse), 3 ♂, 1 ♀, [Morse Cln.,
 Van Buren, Arkansas, IX, 1, 1905. (Morse), 5 ♂, 6 ♀, [Morse Cln.,
 Dardanelle, Arkansas, VIII, 31, 1905. (Morse), 1 ♂, [Morse Cln.,
 Magazine Mountain, Arkansas, VIII, 29, 1905. (Morse), 1 ♂, [Morse Cln.,
 Mena, Arkansas, VIII, 31, 1905. (Morse), 1 ♂, [Morse Cln.,
 De Queen, Arkansas, VII, 29, 1905. (Morse), 1 ♀, [Morse Cln.,
 Ashdown, Arkansas, VII, 27, 1905. (Morse), 3 ♂, 1 ♀, [Morse Cln.,
 Bayou Sara, Louisiana, I, 20, 1879, 1 ♂, [U. S. N. M.,
 Milneburg, Louisiana, VII, 22, 1905. (Morse), 3 ♂, 4 ♀, [Morse Cln.,
 New Orleans, Louisiana, VI, 1883. (Shufeld), 3 ♂, 1 ♀; VI, 7, 1902. (at light), 2 ♀; X to XI, 15, 1882, 1 ♂, 1 ♀, [all U. S. N. M.,
 Crowley, Louisiana, IX, 28 and 30, 1911. (E. S. Tucker; in rice field), 14 ♂, 11 ♀, [U. S. N. M.,
 Winnipeg, Manitoba, VIII, 22, 1877, 1 ♂, [U. S. N. M.,
 Harney's Peak, Black Hills, South Dakota, 7000 to 8000 ft. (Bruner), 1 ♀, [U. S. N. M.,
 West Point, Nebraska, VIII to IX, 6 ♂, 5 ♀, [Hebard Cln.,
 Lincoln, Nebraska, VII to IX, 3 ♂, 3 ♀, 1 juv. ♀, [Hebard Cln.,
 North Platte, Nebraska, VII, 28, 1910. (R. & H.; swampy areas on river plain), 2 ♂, 3 ♀,
 Fort Robinson, Nebraska, VII, 1888, 1 ♀, [Hebard Cln.,
 Glen, Nebraska, VIII, 1903. (L. Bruner), 4 ♂, 5 ♀, [Hebard Cln.,

- Sidney, Nebraska, VII, 30, 1910, (R. & H.), 1 ♂; VIII, 25, 1893, 1 ♀. [Hebard Cln.]
- Belpre, Kansas, IX, 13, 1909, (H.; in field of short grass), 1 ♀.
- Independence, Kansas, (A. Birekfield), 1 ♂, [U. S. N. M.].
- Howe, Oklahoma, VIII, 4, 1905, (Morse), 5 ♂, [Morse Cln.].
- Wilburton, Oklahoma, VIII, 27, 1905, (Morse), 2 ♂, 4 ♀, [Morse Cln.].
- Haileyville, Oklahoma, VIII, 6, 1905, (Morse), 1 ♂, [Morse Cln.].
- Okmulgee, Oklahoma, VI, 24, (J. D. Mitchell; at light), 1 ♀, [U. S. N. M.].
- Shawnee, Oklahoma, VIII, 26, 1905; (Morse), 1 ♂, [Morse Cln.].
- Bonita, Texas, VIII, 14, 1905, (Morse), 1 ♂, 1 ♀, [Morse Cln.].
- Pittsburg, Texas, IX, 9, 1904, (F. C. Bishopp), 2 ♂, [U. S. N. M.].
- Terrell, Texas, VI, 9, 1904, (F. C. Bishopp), 1 ♂, [U. S. N. M.].
- Dallas, Texas, IX, 25 and 26, 1912, (R. & H.; common in field of high grass), 5 ♂, 8 ♀.
- Sagamore Hill, Tarrant County, Texas, IX, 27, 1912, (R. & H.; areas of low grass in open), 2 ♂.
- Doucette, Texas, VII, 24, 1912, (H.), 1 ♂.
- Beaumont, Texas, VII, 23, 1912, (H.; not common on grassy swampy ground), 3 ♂, 5 ♀.
- Calvert, Texas, VIII, 1903, (A. W. Morrill), 1 ♂, [U. S. N. M.].
- Shovel Mount, Texas, VI, 30, 1901, (F. G. Schaupp), 1 ♀, [A. N. S. P.].
- Paige, Texas, VIII, 3, 1904, (C. R. Jones; on cotton), 1 ♂, [U. S. N. M.].
- Kerrville, Texas, VIII, 17 and 18, 1912, (R. & H.), 1 ♂.
- San Antonio, Texas, VIII, 15 and 16, 1912, (R. & H.; common in high grass), 3 ♀.
- Galveston, Texas, VII, 19 to 21, 1912, (H.), 8 ♂, 1 ♀.
- La Marque, Texas, VII, 22, 1912, (H.), 1 ♀.
- Webster, Texas, VII, 19, 1912, (H.; common on grass prairie), 1 ♂, 3 ♀.
- Virginia Point, Texas, VII, 21, 1912, (H.), 1 ♂, 3 ♀.
- Rosenberg, Texas, VII, 25 and 26, 1912, (H.), 2 ♂.
- Wharton, Texas, VII, 12, 1904, (C. R. Jones; on cotton), 1 ♀, [U. S. N. M.].
- Victoria, Texas, VII, 26 and 27, 1912, (H.; common in stream bottom), 2 ♂, 1 ♀.
- Corpus Christi, Texas, VII, 29, 1912, (H.), 1 ♂.
- Gregory, Texas, VII, 30, 1912, (H.), 1 ♂, 1 ♀.
- Lyford, Texas, VIII, 6 and 7, 1912, (R. & H.), 1 ♂, 1 ♀.
- Mission, Texas, VIII, 5 and 6, 1912, (H.), 1 ♂, 1 ♀.
- Brownsville, Texas, VII, 31 to VIII, 5, 1912, (H.), 1 ♂, 2 ♀.
- Piper Plantation, near Brownsville, Texas, VIII, 3, 1912, (R. & H.; grassy spots in heavy river bottom tangle), 3 ♂, 2 ♀.
- Uvalde, Texas, VIII, 21 and 22, 1912, (R. & H.), 1 ♂.
- Del Rio, Texas, VIII, 22 and 23, 1912, (R. & H.; common in grasses of river bottom), 2 ♂, 1 ♀.
- Carrizo Springs, Texas, X, 1884, (A. Wadgymar), 4 ♂, 9 ♀, [Hebard Cln.].
- Benavides, Texas, VIII, 9 and 10, 1912, (R. & H.), 1 ♂.
- Glendive, Montana, VII, 26, 1909, (H.; on river bottoms), 3 ♂, 3 ♀.
- Forsyth, Montana, VII, 27, 1909, (H.), 1 ♂.

Billings, Montana, VII, 28, 1909, (R. & H.; on grassy river plain), 16 ♂, 9 ♀.

Worland, Wyoming, VIII, 1911, 1 ♀, [Hebard Cln.].

Pinebluff, Wyoming, 9 ♂, 27 ♀, [Hebard Cln.].

Julesburg, Colorado, VII, 29, 1910, (R. & H.), 1 ♂, 1 ♀.

Livermore, Colorado, X, 4, 1898, 2 ♂, [U. S. N. M.].

Boulder, Colorado, 1 ♀, [U. S. N. M.].

Pueblo, Colorado, VIII, 30 and 31, 1877, (Scudder), 1 ♀, [M. C. Z.].

Garland, Colorado, VIII, 28 and 29, 1877, (Scudder), 1 ♂, 3 ♀, [M. C. Z.].

Springer, New Mexico, IX, 15, (C. N. Ainslie), 1 ♂, [U. S. N. M.].

Rociada, New Mexico, VIII, 8, (Cockerell), 2 ♀, [U. S. N. M.].

Intermediate material between typical *C. fasciatus* and *C. fasciatus vicinus*.

Jemez Mountains, New Mexico, VIII, 1909, 1 ♀, [Hebard Cln.].

Jemez Hot Springs, New Mexico, VIII, 1 to 29, 1912 and 1913, (J. Woodgate), 7 ♂, 11 ♀, 2 juv. ♀, [Hebard Cln.].

Conocephalus fasciatus vicinus (Morse) (Pls. XVI, XVII and XX, fig. 3; XVII, figs. 5 and 6.)

1881. *Xiphidium ensiferum* Scudder (not of 1862). Second Rept. U. S. Ent. Comm., 1880, App. ii, p. 23. [Glenbrook and Reno, Nevada.]

1881. *Xiphidium brevipenne* Scudder (not of 1862), Second Rept. U. S. Ent. Comm., 1880, App. ii, p. 23. [Sisson and Strawberry Valley, California.]

1881. *Xiphidium fasciatum* Scudder, Second Rept. U. S. Ent. Comm., 1880, App. ii, p. 23. [Portland, Oregon.]

1901. *Xiphidium vicinum* Morse,²⁰ Can. Ent., xxxiii, p. 203. [Palm Springs, San Bernardino, Colton, Los Angeles, Kern City, Lathrop, West Berkeley, Mill Valley, Sisson and Gazelle, California; Ashland, Glendale, Drain and Divide, Oregon; Tenino, Washington.]

1901. *Xiphidium vicinum* variety *productum* Morse,²¹ Can. Ent., xxxiii, p. 204. (Macropterous material in above series.)

This insect has been adequately described by Morse; the distinctive characters given, when compared with typical *fasciatus*, being, in the female, a normally longer ovipositor both actually and in proportion to the caudal femora, and in the male, cerci which are slightly broader just distad of the tooth with the external margins less sinuous. The present series shows further that in this race the form is normally somewhat more robust and the lateral lobes of the pronotum are broader, with cephalic margin more broadly convex and ventro-caudal angle even more broadly

²⁰ Single type designated: ♂; Palm Springs, California, VII, 10, 1897, (Morse), [Morse Cln.]. (Morse and Hebard, Proc. Acad. Nat. Sci. Phila., 1915, p. 106, (1915).)

²¹ Single type designated: ♀; San Bernardino, California, VII, 15, 1897, (Morse), [Morse Cln.]. (Morse and Hebard, Proc. Acad. Nat. Sci. Phila., 1915, p. 106, (1915).)

rounded. The great majority of individuals of this race differ from the average of *fasciatus fasciatus* in having the tegmina just reaching the tips of the caudal femora or falling short of these as much as 3 mm. Examples occur, however, having as long tegmina as are found in *fasciatus* s.s., which condition is more frequently met with in the southern portion of the range of the insect and has been given the name *productum* by Morse. As further differences are wanting to distinguish such material, we are obliged to place this name in the synonymy of the present form. The phase having very long tegmina and wings is represented by the following material before us: 2 ♂, Mountain Home, Idaho; 1 ♂, 2 ♀, Shoshone, Idaho; 1 ♂, Milford, Utah; 1 ♂, Reno, Nevada; 2 ♂, Alamitos Bay, California, and 1 ♂, Los Angeles, California. An almost intermediate condition is shown in a number of individuals from Council Crest and Divide, Oregon, and in two ♂ from Milford, Utah.

In life the present race is normally quite as green in general coloration with abdominal markings brighter than in typical *fasciatus*; the following field note taken from fresh material at Shoshone and Mountain Home, Idaho, demonstrates this very clearly—"Abdomen with a medio-dorsal band of vandyke brown, wider cephalad, narrowing gradually caudad, bordered by lemon yellow bands about half as wide. In the males the rest of the abdomen is grass green, in the females these lemon yellow bands are in turn bordered on each side by very narrow bands of vandyke brown." The large series before us, though otherwise in excellent condition, is almost without exception much discolored and faded, the cerci of the males retaining a green coloration in only a few cases.

The genicular areas of the caudal femora are not darkened; the genicular lobes of the same are normally bispinose; the ventro-external margins of the caudal femora are normally unarmed, very small (usually microscopic) spines are present in one hundred and fifty-two specimens examined as follows:

Number of spines,	0-0	0-1	0-2
Number of specimens,	146	5	1

This shows 3.9% of the material to have these margins armed with such adventitious spines.

The ovipositor length is as follows: Mountain Home, Idaho, 11.2-12.6; Soda Springs, Idaho, 9.2-10.7; Council Crest, Oregon,

9-10.7; Sisson, California, 9.8-11.2; Los Angeles, California, 12; Reno, Nevada, 10.3-11.7; Milford, Utah, 10.7-11.7 mm. Morse, in his excellent series of measurements given with the original description, shows the extremes of ovipositor length to be 7.5 to 13 mm. in the present insect.

The present geographic race is distributed over the region of Pacific drainage in the United States, having been found from Soda Springs, Idaho, and Milford, Utah, as far north as Tenino, Washington, and Agassiz, British Columbia,²² and south to Alamitos Bay and Palm Springs, California. In the desert regions of this area, the species is to be found often very numerous in green vegetation in irrigated areas or where other constant sources of water supply exist.

Specimens Examined: Previously recorded, 122. Here recorded, 201; 101 males, 92 females and 5 immature females.

Soda Springs, Idaho, 7 ♂, 7 ♀, [Hebard Ch.].

Shoshone, Idaho, VIII, 8, 1910, (R. & H.; occasional in an irrigated area), 4 ♂, 4 ♀.

Mountain Home, Idaho, VIII, 9, 1910, (R. & H.; scarce in an irrigated area), 1 ♂, 2 ♀.

Nampa, Idaho, VIII, 9, 1910, (R. & H.; in a marshy meadow), 5 ♂, 1 ♀.

Reno, Nevada, IX, 2, 1910, (R. & H.; in grassy irrigated tract), 14 ♂, 6 ♀.

Wabuska, Nevada, IX, 5, 1910, (H.; common in grasses about water tank), 1 ♂, 3 ♀.

Salt Lake Valley, Utah, VIII, 1 to 4, 1877, (Scudder), 18 ♂, 11 ♀, [M. C. Z.].

Provo, Utah, VIII, 23 and 24, 1877, (Scudder), 2 ♂, 4 ♀, [M. C. Z.].

Milford, Utah, IX, 5, 1909, (R. & H.; very common in grasses along river), 28 ♂, 39 ♀.

Longmire's Springs, Mount Rainier, Washington, 2700 ft., VIII, 23, 1910, [H.; grasses about springs], 1 ♂.

Pullman, Washington, VIII, 19, 1909, (J. A. Hyslop), 1 ♂, [U. S. N. M.].

Newaukum, Washington, VIII, 8, 1909, (H.; in bulrushes and bracken), 1 juv. ♀.

Mount Tabor, Oregon, VIII, 9, 1909, (R.; high grasses in open), 1 ♂.

Council Crest, Oregon, VIII, 9, 1909, (H.; not common in field of high dry grass), 8 ♂, 8 ♀, 2 juv. ♀.

Clackamas, Oregon, VIII, 9, 1909, (H.; in high grasses), 1 ♀.

West Albany, Oregon, VIII, 10, 1909, (R. & H.), 1 ♂, 1 ♀.

Divide, Oregon, VIII, 11, 1909, (R. & H.; occasional in dry meadow grasses), 5 ♂, 1 ♀.

²² This record of *F. Walker* as *fasciatus* we have been unable to verify, but there is little doubt that the material will be found to belong to the present race.

Sacramento, California, VIII, 18, 1907, (E. S. G. Titus), 1 ♂, 1 ♀, [U. S. N. M.]
 Bakersfield, California, IX, 14, 1910, (R. & H.; grasses along irrigating ditch), 3 ♂, 1 ♀.

Los Angeles, California, 1889, (Coquillett), 4 ♂, 1 ♀, 2 juv. ♀, [Hebard Cln.].

Conocephalus spinosus (Morse)²³ (Pls. XVI, XVII and XX, fig. 4; XVIII, figs. 7 and 8.)

1901. *Xiphidium spinosum* Morse,²⁴ Can. Ent., xxxiii, p. 201. [Coronado, California.]

As the author of this species has given a really excellent description, it is rather irritating to find it synonymized by Karny²⁵ under *C. saltator*, where, without material for comparison, that author briefly states that it is a smaller variation.

The species is known only from the salt marshes about San Diego Bay, California; the type series of three males, two females and one immature female in the Morse Collection and Museum of Comparative Zoology, and in addition three males and one female in Philadelphia, have been examined.

Conocephalus gracillimus (Morse) (Pl. XV, fig. 8; XVI, XVII and XX, 5; XVIII, 9 and 10; XIX, 11.)

1877. *Xiphidium ensiferum* Scudder, (not *ensifer* of Scudder, 1862), Proc. Bost., Soc. Nat. Hist., xix, p. 83. [Fort Reed, Florida.]

1901. *Xiphidium gracillimum* Morse,²⁶ Can. Ent., xxxiii, p. 236. [Capron [Viking] and Biscayne Bay [Miami], Florida.]

The present species belongs to a small group, the other species of which are Antillean and tropical American, which is in the main distinguished from the forms more nearly related to *C. fasciatus* by the majority of the characters given in the key for the present insect. When compared with *fasciatus*, the more produced vertex and broader convex callosities of the lateral lobes of *gracillimus* are found to be characters which are somewhat less conspicuous than might be expected; the present species is more

²³ For a full discussion of the present species see following study by Rehn and Hebard, Trans. Am. Ent. Soc., xli, (1915).

²⁴ Single type designated: ♂; Coronado, California, VII, 24, 1897, (Morse; on salt marsh), [Morse Cln.]. (Morse and Hebard, Proc. Acad. Nat. Sci. Phila., 1915, p. 105, (1915).)

²⁵ Abh. k.-k. zool.-botan. Gesell. Wien, iv, p. 91, (1907).

²⁶ Single type here designated: ♂; [Miami] Biscayne Bay, Florida, (Mrs. A. T. Slosson), [M. C. Z.]. (Morse and Hebard, Proc. Acad. Nat. Sci., Phila., 1915, p. 105, (1915).)

readily distinguished by the decidedly more slender form, differently shaped lateral lobes of the pronotum, narrower tegmina with male tympanum decidedly more elongate, different coloration, and different male cerci.

Lateral lobes of pronotum broad, cephalic margin moderately oblique and nearly straight to the very broadly obtuse-angulate ventro-cephalic angle, thence very weakly concave and slightly more horizontal than usual to the sharply rounded ventro-caudal angle which is slightly less than 90° , caudal margin convex to the broad and distinct humeral sinus, convex callosity very broad. These lobes are often more or less distinctly marked mesad with a diffused dark postocular stripe. The abdomen is marked in dark individuals with three narrow dark bands, one meso-dorsal, the others lateral, the two intervening spaces forming usually bright yellow bands. The pronotal markings, combined with the narrowness of the abdominal bands, give individuals showing the intensive color pattern a much more striped appearance than is ever found in *fasciatus*. The cerci are bright green or dark brown;²⁷ the greater production, especially of the distal portion, causing the internal tooth to be situated in relative position just proximad of the point which it occupies in *fasciatus*. Though the genicular lobes of the caudal femora are normally bispinose, fifteen of the series of sixty-six specimens examined for this character have one of these lobes unispinose, two have two of the same showing this condition, while two have three of the genicular lobes unispinose. In this species the genicular areas of the caudal femora are not darkened; the ventral margins of the caudal femora are unarmed. Immature examples of *gracillimus* are very slender and very strongly tristriate.²⁸

The present species is confined in distribution to the Florida Keys and the mainland of southern Florida as far north as Fort

²⁷ In life the male cerci are probably always green or greenish, this color is one of the most likely to disappear in dried material.

²⁸ Of the immature specimens recorded as this species by the present authors, Proc. Acad. Nat. Sci. Phila., 1912, p. 268, (1912), those from Miami and Homestead, Florida, are immature examples of *Orebelinam concinnum*, while the two immature individuals from Key Vaca and Key West, Florida, are specimens of *Odontorhaphidium apterum*. These errors were due to our then very limited knowledge of the early stages of these species, which exhibit indeed a general (though not detailed) similarity to *gracillimus*.

Reed and Tampa, in which region the authors have taken a series of eighty-three specimens.

Specimens Examined: Previously correctly recorded, 95. Here recorded, 1 male, 1 female and 1 immature female.

Fort Reed, Florida, IV, 21, 1876. (J. H. Comstock), 1 juv. ♀, [Cornell Univ.].

Lemon City, Florida. (E. J. Brown), 1 ♂, [U. S. N. M.].

Biscayne, Florida, V, 23, 1 ♀, [U. S. N. M.].

Conocephalus brevipennis (Scudder) (Pls. XVI and XVII, fig. 6; XVIII, 11 and 12; XX, 6 and 7.

1862. *Xiphidium brevipennis* Scudder,²⁹ Can. Nat. and Geol., vii, p. 285.³⁰ [New England.]

1862. *X*[*iphidium*] *ensifer* Scudder, Bost. Journ. Nat. Hist., vii, p. 451. [Lawn Ridge, Illinois.] (In part.)

1869. *Xiphidium ensiferum* F. Walker, Cat. Dermapt. Salt. Br. Mus., ii, p. 270. [United States.]

1875. *Xiphidium gossypii* Scudder,³¹ Proc. Bost. Soc. Nat. Hist., xvii, p. 462. [Texas; Mississippi.]

Scudder's *ensifer*, emended *ensiferum* by F. Walker, is based upon two females from Lawn Ridge, Illinois, now in the Museum of Comparative Zoology; one of these, which we here select as single type, is a brachypterous example of *Conocephalus brevipennis*; in this specimen the caudal femur is 13.1, the ovipositor 13.7 mm. in length. The other specimen is a brachypterous example of *C. strictus*. At that time the latter species was undescribed, but the confusion of two so very distinct species is almost incredible.

Scudder's *gossypii* is also a synonym of the present species, based upon material from Texas and Mississippi, which agrees throughout with typical *brevipennis* from New England, except in the somewhat greater size.

The present species and *C. spartinae*, though distantly related, are very similar in general appearance and have been fully

²⁹ Single type here designated: ♀; Massachusetts, [M. C. Z.]. Measurements; length of body 13.2, of tegmen 9, of caudal femur 11, of ovipositor 9.4 mm.

³⁰ Scudder's description of *X* [*iphidium*] *brevipennis*, in the Bost. Journ. Nat. Hist., vii, p. 451, was published in November 1862, while this, the original description, appeared in August and September of the same year; to it was added a record from the Red River Settlements, Manitoba, properly assigned to *C. saltans* here.

³¹ Single type here designated: ♀; Texas, (Belfrage), [M. C. Z.]. Measurements; length of body 14.1, of tegmen 8.4, of caudal femur 16.8, of ovipositor 13.1 mm.

compared under the latter species. Females of the two species are difficult to separate, but, in addition to a somewhat different facies, this sex of *brevipennis* is found to have the ovipositor averaging distinctly longer and straighter.

Lateral lobes of pronotum moderately broad, cephalic margin straight to the broadly obtuse-angulate ventro-cephalic angle, thence straight to the rather broadly rounded ventro-caudal angle which is slightly less than 90° , caudal margin weakly convex to the distinct humeral sinus, convex callosity moderately broad.

Though the distinctive male cerci of this species usually show little or no variation, a single specimen in the series from Cornwells, Pennsylvania, has the apex of these organs acute and very narrowly rounded, an abnormality found in no other male of the species before us.

The tegmina in the males usually just reach the bases of the brown cerci, in the females they are shorter, covering usually about two-thirds of the dorsum of the abdomen; somewhat greater tegminal abbreviation sometimes occurs, however, and macropterism very rarely takes place, this condition being represented in 3.2% of the examples in the series here recorded, 7 males and 11 females.

The genicular areas of the caudal femora are usually weakly infuscated in the present species; the genicular lobes of the same are normally bispinose but frequent examples are met with which have one, two or three of these lobes unispinose, examples are very rare in which all of the genicular lobes of the caudal femora are unispinose. The ventro-external margins of the caudal femora are normally unarmed, small spines are present in three hundred and forty-one perfect specimens examined as follows:

Number of spines,	0-0	0-1	0-2	0-3	1-1	1-2	1-3	2-2	3-2	5
Number of specimens,	267	43	6	1	11	6	1	4	1	1

This shows 21.7% of the material to have these margins armed; as in *fasciatus*, geographic distribution apparently does not influence this condition, but in the present species the spines when present are usually heavier than in that insect.

The ovipositor length is as follows: Saunderstown, Rhode Island, 9.1-10.8; Diamond Valley, Pennsylvania, 11.6-12.7; Cornwells, Pennsylvania, 10.3-13.1; Chestnut Hill, Pennsylvania,

11.4-14.7; Tinicum, Pennsylvania, 8.9-11.8; Castle Rock, Pennsylvania, 11.4-13.6; Cedar Springs, New Jersey, 9.3-10.8; Fayetteville, North Carolina, 9.7-10.8; Wilmington, North Carolina, 9.2-9.6; Florence, South Carolina, 10.6-11.9; Yemassee, South Carolina, 9.3-9.6; Atlantic Beach, Florida, 9.4; Moline, Illinois, 11.4-13.7; West Point, Nebraska, 10.5-14.7 mm. The ovipositor varies slightly from the normal perfectly straight type to one in which an extremely weak upward curvature is appreciable, suggesting the type found in *spartinae*, and one in which an open sigmoid curvature is barely indicated, to the weakest appreciable degree. The specimens from West Point, Nebraska, have the ovipositor slightly heavier and averaging longer than in any eastern series. Of the eastern material, that from drier upland situations (Diamond Valley, Cornwells (back from the river), Chestnut Hill, Castle Rock, Pennsylvania; Fayetteville, North Carolina; Florence, South Carolina, and a number of other localities) has the ovipositor frequently showing a suggestion of an open-sigmoid curvature and averaging longer than in material from marsh or swamp lands (Tinicum, Pennsylvania; Wilmington, North Carolina; Yemassee, South Carolina; Atlantic Beach, Florida, and other localities), and we believe the differences discussed above probably to be due wholly to environmental conditions,³² particularly those governing oviposition, which in situations of different character would indicate that different plants are selected as the receptacles for the eggs.

The present species is known from Eastport, Maine; Montreal, Quebec, and Algonquin Park, Ontario to Atlantic Beach, Florida,³³ and the Gulf coast as far as Beaumont, Texas. The

³² Different variations are found in occasional species, primarily due it would seem to immediate environmental conditions and not sufficient to warrant trinomial recognition. See under *C. nigropleuroides* in the present paper and under *C. cinereus* and *saltator* in the next paper of the present series. Also under *Orchelimum concinnum*, Trans. Am. Ent. Soc., xli, pp. 15 and 62, (1915), and under *Nemobius fasciatus fasciatus* and its geographic race *socius*, Proc. Acad. Nat. Sci. Phila., 1913, pp. 410 and 424, (1913).

³³ Further south in Florida this species has not been found. Scudder's 1877 record, with a query, of an immature individual from Fort Reed as his *ensiferum*, applies to *Conocephalus gracillimus*; while the present authors' record from Chokoloskee we now know to be based upon material incorrectly labelled and probably taken in the vicinity of New York, New York.

westernmost records are Minnesota³⁴; North Platte, Nebraska, and Texas (probably Dallas), the species apparently not reaching far beyond the limits of the naturally well watered regions.³⁵ The insect is numerous and widely distributed over the Upper Austral Zone of the central Atlantic and upper Mississippi Valley regions of the United States, but is found local and usually quite scarce in the lowlands of the southeastern states.

Specimens Examined: Previously recorded, over 100. Here recorded, 555; 257 males, 286 females, 2 immature males and 10 immature females.

Montreal, Quebec, VIII, 30, 1902, (C. Stevenson), 1 ♀, [U. S. N. M.].

Seabrook, New Hampshire, (A. A. Eaton), 1 ♀, [U. S. N. M.].

Jaffrey, New Hampshire, IX, 23, 1896, (S. Henshaw), 6 ♂, 16 ♀, [M. C. Z.].

Marion, Massachusetts, VIII, 1905, (H.); grasses in woods), 4 ♂, 5 ♀.

Saunderstown, Rhode Island, IX, 3 to 7, 1913, (H.); common in upland grasses and vines near woods), 7 ♂, 11 ♀.

Wesquage Beach, Rhode Island, IX, 8 and 10, 1913, (H.); in grasses and vines near woods and on edge of salt marsh), 2 ♂, 6 ♀.

Niverville, New York, VIII, 24, 1904, (Morse), 3 ♂, [Morse Cln.].

Chatham, New York, VIII, 9, 1904, (Morse), 4 ♂, 2 ♀, [Morse Cln.].

Clifton Springs, New York, 1 ♂, 1 ♀, [Cornell Univ.], (macropterous).

Ithaca, New York, VIII, 4 to X, 12, 1885 to 1894, 22 ♂, 24 ♀, [Cornell Univ.], (1 ♂ macropterous).

Tolyhanna, Pennsylvania, IX, 1903, (H.), 1 ♂, 5 ♀.

Stroudsburg, Pennsylvania, IX, 1903, (H.); in high grasses), 2 ♂, 1 ♀.

Dauphin, Pennsylvania, IX, 15, 1 ♂, [Pa. State Dept. Zool.].

Harrisburg, Pennsylvania, VIII, 16, 1 ♀, [Pa. State Dept. Zool.].

Progress, Pennsylvania, X, 10, 1 ♀, [Pa. State Dept. Zool.].

Marysville, Pennsylvania, X, 6 and 7, 4 ♂, 1 ♀, [Pa. State Dept. Zool.].

Bristol, Pennsylvania, IX, 1912, (H. W. Fowler), 1 ♀, [A. N. S. P.].

Woodlands Cemetery, Philadelphia, Pennsylvania, X, 7, 1906, (B. Long), 1 ♂, 1 ♀, [A. N. S. P.].

Cornwells, Pennsylvania, IX, 7, 1914, (H.); everywhere in low shrubbery and grasses along river and on edge of woods), 10 ♂, 3 ♀, 2 juv. ♀; IX, 11, 1906, (R. & H.), 1 ♂, 6 ♀.

Ashbourne, Pennsylvania, X, 27, 1906, (B. Long), 2 ♂, 5 ♀, [A. N. S. P.].

³⁴ Though not so stated by Luggler, it is virtually certain that the species is common in Minnesota only as far north as the border of the Canadian Zone. Scudder's record of this species from the Red River Settlements, Manitoba, applies to *C. saltans*.

³⁵ Scudder's records of *bevipennis* from California and *ensifer* from Nevada apply to *C. fasciatus vicinus*, to which insect the present species shows decided similarity in many respects, but may be readily separated by the differences of coloration and genitalia.

Chestnut Hill, Pennsylvania, VIII, 5, to X, 4, 1903 to 1911, (H.; in grasses near woods), 3 ♂, 7 ♀.

Wissahickon Creek, Chestnut Hill, Pennsylvania, IX, 9, 1914, (H.; grasses in openings of forest), 2 ♂, 1 ♀.

Swarthmore, Pennsylvania, X, 13, 1906, (E. T. Cresson Jr.), 1 ♀, [A. N. S. P.].

Castle Rock, Delaware County, Pennsylvania, IX, 19, 1909, (R. & H.; common in luxuriant undergrowth of heavy deciduous forest), 5 ♂, 14 ♀, (2 ♀ macropterous).

Devon, Pennsylvania, IX, 14, 1905, 1 ♀, [A. N. S. P.].

Tinicum Island, Pennsylvania, VIII, 13 to IX, 29, 1903 to 1911, (R. & H.; very abundant near marsh in rank grass), 38 ♂, 42 ♀.

Fern Hill, Chester County, Pennsylvania, IX, 19, 1909, (R. & H.; grasses on serpentine outcrop), 3 ♂, 7 ♀.

Shady Nook, Sullivan County, Pennsylvania, VIII, 6 and 7, 1908, (Witmer Stoue), 1 ♂, [A. N. S. P.].

Diamond Valley, Huntingdon County, Pennsylvania, IX, 10, 1905, (R.), 3 ♂, 4 ♀.

Euporium, Pennsylvania, X, 1905, (H. W. Fowler), 2 ♀, [A. N. S. P.].

Beatty, Pennsylvania, (O. Brugger), 2 ♂, 2 ♀, [A. N. S. P.].

Lindenwold, New Jersey, X, 31, 1914, (B. Long), 2 ♂, [A. N. S. P.].

Woodbury, New Jersey, X, 2, 1907, (C. B. Hardenberg), 1 ♂, 1 ♀, [A. N. S. P.].

Stafford's Forge, New Jersey, VIII, 12 to IX, 16, 1905 to 1908, (R. & H.), 6 ♂, 5 ♀.

Mays Landing, New Jersey, VIII, 29, 1914, (H.; in boggy pine barrens), 1 ♀.

Reega, New Jersey, VIII, 29, 1914, (H.; scarce in undergrowth of pine barrens), 1 ♂, 1 ♀.

Margate City, New Jersey, VIII, 17, 1914, (H.; grasses on dry ground on edge of salt marsh), 1 ♂, 2 ♀.

Cedar Springs, New Jersey, VIII, 14 and 26, 1914, (H.; tall grasses on border of fresh marsh), 38 ♂, 9 ♀, 2 juv. ♀, (1 ♂ macropterous).

Plummers Island, Maryland, VIII, 6 and 29, 1901 and 1904, (Currie, Barber), 1 ♂, 1 ♀, [U. S. N. M.].

Cabin John, Maryland, IX, 23, 1911, 1 ♂, 2 ♀, [U. S. N. M.].

Washington, District of Columbia, IX, 1883, 1 ♀, [Hebard Ch.].

Anolostan Island, District of Columbia, IX, 6, 1912, (Caudell), 1 ♀, [U. S. N. M.].

Marshall Hall, Maryland, VIII, 9, 1883, 1 juv. ♀, [Hebard Ch.].

Roslyn, Virginia, IX, (Caudell), 1 ♂, [U. S. N. M.].

Falls Church, Virginia, IX, 4 and 28, 1906, 3 ♂, 2 ♀, [U. S. N. M.].

Appomattox, Virginia, IX, 6, 1903, (Morse), 2 ♂, 3 ♀, [Morse Ch.].

Wytheville, Virginia, IX, 4, 1903, (Morse), 1 ♀, [Morse Ch.].

Cape Henry, Virginia, IX, 7, 1903, (Morse), 1 ♀, [Morse Ch.].

Norfolk, Virginia, IX, 8, 1903, (Morse), 2 ♀, 1 juv. ♀, [Morse Ch.].

- Virginia Beach, Virginia, IX, 7, 1903, (Morse), 1 ♂, 2 ♀, [Morse Chn.]; X, 6, (F. Knab), 1 ♀, [U. S. N. M.].
- Fayetteville, North Carolina, IX, 9, 1911, (R. & H.), 1 ♂, 1 ♀.
- Roan Mountain, North Carolina, VIII, 31, 1903, (Morse), 3 ♂, 2 ♀, [Morse Chn.].
- Linville, North Carolina, VIII, 30, 1903, (Morse), 7 ♂, 3 ♀, 2 juv. ♂, [Morse Chn.].
- Saluda, North Carolina, VIII, 17, 1903, (Morse), 2 ♂, [Morse Chn.].
- Governors Island, North Carolina, VIII, 20, 1903, (Morse), 1 ♂, 3 juv. ♀, [Morse Chn.].
- Wilmington, North Carolina, IX, 8, 1911, (R. & H.), 4 ♂, 3 ♀.
- Lake Waccamaw, North Carolina, IX, 8, 1911, (R. & H.; in high weeds on lake shore), 3 ♂, 3 ♀.
- Spartanburg, South Carolina, VIII, 6, 1913, (H.), 1 juv. ♂.
- Florence, South Carolina, IX, 6, 1911, (R. & H.; in green undergrowth of deep forest and in grasses on its edge), 7 ♂, 5 ♀.
- Yemassee, South Carolina, IX, 4, 1911, (R. & H.; grasses on edge of forest), 3 ♂, 2 ♀, 1 juv. ♀.
- Atlanta, Georgia, VIII, 2, 1913, (R. & H.), 1 juv. ♂.
- Savannah, Georgia, VIII, 14, 1903, (Morse), 1 ♂, [Morse Chn.].
- Sandfly, Georgia, IX, 3, 1911, (R. & H.), 1 ♂, 1 ♀.
- Homerville, Georgia, VIII, 27, 1911, (R. & H.), 1 ♂.
- Billy's Island, Okefenokee Swamp, Georgia, IX, 1 to 5, 1913, (J. C. Bradley), 1 ♀, [Cornell Univ.].
- Atlantic Beach, Florida, VIII, 24, 1911, (R. & H.), 2 ♂, 1 ♀.
- South Jacksonville, Florida, IX, 7, 1913, (W. T. Davis), 1 ♀, [Davis Chn.].
- Windsor, Ontario, IX, 1894, 2 ♂, [Cornell Univ.].
- Cuyahoga Falls, Ohio, VIII, 14, 1904, (W. V. Warner), 1 ♂, [U. S. N. M.].
- Salineville, Ohio, IX, 10, 1892, 1 ♀, [Cornell Univ.], (macropterous).
- Roan Mountain Station, Tennessee, IX, 3, 1903, (Morse), 3 ♀, [Morse Chn.].
- Johnson City, Tennessee, VIII, 27, 1903, (Morse), 1 ♂, 1 ♀, [Morse Chn.].
- Chattanooga, Tennessee, VIII, 24, 1903, (Morse), 4 ♂, 5 ♀, [Morse Chn.].
- Flomaton, Alabama, VIII, 2, 1903, (Morse), 1 ♂, [Morse Chn.].
- Chicago, Illinois, IX, 9, 1904, (H.; in waste field), 1 ♀.
- Moline, Illinois, IX, (McNeill), 1 ♂, 2 ♀, [Hebard Chn.].
- West Point, Nebraska, IX and X, 1884 and 1885, (L. Bruner), 19 ♂, 33 ♀, [Hebard Chn.], (4 ♂, 6 ♀ macropterous).
- Weeping Water, Nebraska, IX, 24, 1909, (L. Bruner), 1 ♀, [Hebard Chn.].
- Lincoln, Nebraska, VIII (taken at light), 1 ♀, [Hebard Chn.], (macropterous).
- Table Rock, Nebraska, VIII, 25, 1904, (H.; in high grass), 1 ♀.
- North Platte, Nebraska, VIII, 28, 1910, (R. & H.; swampy areas on river plain), 1 ♂.
- Hopkins, Arkansas, IX, 12, 1904, (C. R. Jones), 1 ♂, [U. S. N. M.].
- Beaumont, Texas, VIII, 23, 1912, (H.; grasses on swampy ground), 1 ♂.

Conocephalus resacensis³⁶ new species (Pl. XV, fig. 6; XVI, 7; XVII, 7; XVIII, 13 and 14; XX, 8.)

The present species somewhat resembles *C. allardi* and *C. brevipennis* but differs from both in the attenuate form, wider vertex, smoother pronotum with lateral lobes even more elongate than in *allardi*, different and paler coloration, much more elongate caudal femora with genicular areas not darkened, (genicular lobes normally unispinose as in *allardi*), and very different male genitalia, though with subgenital plate of the normal type of the subgenus *Xiphidion*, as found in *brevipennis*.

Type.—♂; Piper Plantation near Brownsville, Texas. August 3, 1912. (Rehn and Hebard.) [Hebard Collection, Type No. 171.]

Description of Type.—Size rather large for the genus, form slender and surface very smooth. Head with dorsum of vertex, when seen from the lateral aspect, scarcely at all depressed proximad, in same plane as the occiput; fastigium of vertex nearly as wide as basal antennal joint, narrowing with a decided concavity to facial suture; eyes normal. Pronotum elongate, rounding smoothly into the lateral lobes which are considerably longer than deep with surface very smooth, cephalic margin of lateral lobes broadly and evenly arcuate to the ventro-caudal angle which is moderately rounded and rectangulate, caudal margin of same very weakly convex to the very shallow and scarcely appreciable humeral sinus, convex callosity very broad, somewhat broader than in *allardi* and decidedly broader than in *brevipennis*. Tegmina slightly more than half the length of the caudal femora, structure very delicate with veins weaker than in *brevipennis*; stridulating area similar but smaller in proportion with stridulating vein and veins of the speculum decidedly heavier than in that species, in this latter respect more as in *allardi*; wings slightly shorter than tegmina. Abdomen and cerci unicolorous. Cerci elongate; the median half quite evenly and decidedly swollen and bearing on the internal margin at the point of greatest diameter a rather long tooth, which is broad at its base and is situated slightly lower than mesad (in vertical sense) but entirely visible from above, this tooth directed meso-ventrad with apex sharp and decurved; external margin of cercus very weakly concave, nearly straight; distad the cercus narrows evenly from the swollen portion to the narrow blunted apex, which portion of the cercus is very weakly depressed. Subgenital plate bearing disto-laterad styles .7 mm. in length, the sockets of which are produced beyond the transverse distal margin of the plate. Cephalic and median femora much as in *brevipennis*, caudal femora very long and more attenuate than in *brevipennis*, with enlarged proximal portion tapering much more gently and with ventral margins unarmed, genicular lobes unispinose.³⁷

³⁶ In reference to the "resacas" or ancient and now cut off and dried out curves of the Rio Grande, in the grasses of which, surrounded by the low heavy jungle of the river plain, the present species makes its home.

³⁷ The immature male before us shows this character to be variable, as this specimen has the genicular lobes bispinose.

Allotype.—♀; data same as the type.

Description of Allotype.—Similar to type, very slightly larger. Lateral lobes of pronotum longer with caudal margin straight and humeral sinus obsolete. Tegmina lanceolate with rather sharply rounded apex, half as long as abdomen; wings very slightly longer. Ovipositor longer than caudal femur, straight. The subgenital plate embraces the base of the ovipositor and has the distal margin broadly arcuate.

	<i>Measurements (in millimeters)</i>					
	Length of body	Length of pronotum	Length of tegmen	Length of caudal femur	Length of cercus	Length of ovipositor
<i>Type</i> , ♂.	17.2	3.7	7.1	13.4	2.1	—
<i>Paratype</i> , ♂.	16.7	3.9	8.8	14.2	2.1	—
<i>Allotype</i> , ♀.	16.7	4.1	6	14.4	—	15.2
<i>Paratype</i> , ♀.	16.8	4.1	5.6	14.9	—	15.6

In the paratype female before us the ovipositor shows a very slight curvature.

Coloration.—Dorsum of head and pronotum with a very broad median band of cinnamon brown, margined laterad with light buff. Eyes tawny. Tegmina and wings transparent and pale buff. Abdomen (of male) uniform ochraceous tawny including cerci, (of female) dorso-proximal and entire distal portion including ovipositor cinnamon brown tinged with tawny. The remaining portions of head, body and limbs, including the genicular areas of the caudal femora, Vanderpoel's green (Ridgeway). The allotype has alone retained in large measure the original coloration.

The present material was taken among luxuriant grasses growing in the openings of the almost impenetrable jungles of palm, huisache, ebony and many other trees, which occupy the low country along the Rio Grande below Brownsville.

Specimens Examined: 6; 2 males, 2 females, 1 immature male and 1 immature female.

Piper Plantation near Brownsville, Texas, VIII, 3, 1912, (R. & H.), 2 ♂, 2 ♀, *type*, *allotype* and *paratypes*, 1 juv. ♂, 1 juv. ♀.

Conocephalus nemoralis (Scudder) (Pl. XVI, figs. 8 and 9; XVII, 8; XVIII, 15 and 16; XIX, 12; XX, 9.)

1875. *Xiphidium nemorale* Scudder,³⁵ Proc. Bost. Soc. Nat. Hist., xvii, p. 462. [Dallas County, Iowa.]

1891. *Xiphidium curtipenne* Redtenbacher, Verh. Zool.-botan. Gesell. Wien, xli, pp. 498, 522. [Missouri.]

³⁵ Single type here designated: ♂; Dallas County, Iowa, IX, 3, (J. A. Allen) [M. C. Z.]. Measurements: length of body 10.8, of tegmen 8, of caudal femur 12.2 mm.

Scudder has properly synonymized Redtenbacher's *curtipenne* with the present species.³⁹

The present insect is very striking in form, coloration and ovipositor, which latter, though not strongly, is more decidedly curved than in any other North American species of the genus. The species is dark brown in general coloration, often strongly tinged with burnt lake and sometimes with green; the dorsum of the pronotum, particularly in paler individuals, is bordered by very narrow lateral lines of the same pale color which make the tegminal veins and veinlets so conspicuous in the present species, these lateral lines are continued on the head, converging to the vertex which they border.

Lateral lobes of pronotum with cephalic margin moderately convex to the ventro-caudal angle with the ventro-cephalic angle weakly indicated, ventro-caudal angle rather broadly rounded, rectangulate, caudal margin exceedingly weakly convex to the subobsolete humeral sinus, convex callosity moderately broad.

Macropterism is very rare, we have but two examples of this condition before us, females from Plummer's Island, Maryland, and Asheville, North Carolina.

The genicular areas of the caudal femora are always infuscated; the genicular lobes of the same are each furnished with a single rather heavy spine or very occasionally bispinose; the ventral margins of the caudal femora are unarmed.

The ovipositor length is as follows: Beatty, Pennsylvania, 9.2; Asheville, North Carolina, 8.6-9.5; Marion County, Indiana, 8.8-9; Moline, Illinois, 8.6; West Point, Nebraska,⁴⁰ 7.8-8.7 mm. Though normally distinctly but not very strongly curved, the ovipositor is found to vary occasionally in the degree of this curvature as well as in length and heaviness.

The present species is widely distributed over the upper Mississippi valley region as far north as West Spring Green, Wisconsin, and is known eastward as far as the Hudson Palisades in New Jersey; Harrisburg, Pennsylvania; Washington, D. C., and Asheville, North Carolina, and westward as far as West Point and Lincoln, Nebraska, and Wichita, Kansas.

³⁹ Can. Ent., xxx, p. 181, (1898).

⁴⁰ One female from West Point, Nebraska, has the ovipositor only 6.7 mm. in length, but the whole organ appears to be somewhat abnormal and we have consequently omitted reference to this individual elsewhere.

- Specimens Examined:* Previously recorded, over 70. Here recorded 77; 23 males, 44 females, 4 immature males and 6 immature females.
- Dauphin, Pennsylvania, IX, 15, 1 ♀, [Pa. State Dept. Zool.,].
- Harrisburg, Pennsylvania, VIII, 18, 1 ♂, 2 ♀, 2 juv. ♀, [Pa. State Dept. Zool.,].
- Highspire, Pennsylvania, IX, 20, 1 ♀, [Pa. State Dept. Zool.,].
- Middletown, Pennsylvania, IX, 5, 2 ♀, [Pa. State Dept. Zool.,].
- Beatty, Pennsylvania, (O. Brugger), 1 ♂, 1 ♀, [A. N. S. P.,].
- Sharpsburg, Maryland, IX, 18, 1903, (Caudell), 1 ♂, [U. S. N. M.,].
- Plummer's Island, Maryland, VIII, 25 to X, 25, (Caudell, Barber, Fisher, McAtee, Clemons), 9 ♂, 7 ♀, [U. S. N. M.,]. 1 ♀ macropterous.
- Washington, District of Columbia, VIII, 1883, (A. Koehle), 1 ♀, [Hebard Chn.,].
- Luray, Virginia, IX, 2, 1906, (F. Knab), 1 ♀, [U. S. N. M.,].
- Roan Mountain Station, Tennessee, IX, 3, 1903, (Morse), 1 ♂, 4 ♀, 4 juv. ♂, 3 juv. ♀, [Morse Chn.,].
- Clarksville, Tennessee, IX, 24 and 25, 1913, (S. E. Crumb; on tobacco), 2 ♂, [U. S. N. M.,].
- Springvale, Tennessee, VIII, 30, 1900, 1 ♀, [Morse Chn.,].
- West Spring Green, Wisconsin, VIII, 26, 1906, (J. D. Hood), 1 ♀, [Pa. State Dept. Zool.,].
- West Point, Nebraska, IX, 1, (Bruner), 4 ♀, [Hebard Chn.,].
- Omaha, Nebraska, 1 ♂, 1 ♀, [A. N. S. P.,].
- Ashland, Nebraska, 1 ♀, [A. N. S. P.,].
- Weeping Water, Nebraska, IX, 24, 1909, (Bruner), 2 ♂, 8 ♀, [Hebard Chn.,].
- Lincoln, Nebraska, IX, 15, (Bruner), 1 ♂, 1 ♀, [Hebard Chn.,].
- Des Moines, Iowa, VIII, 26, 1903, (Caudell), 1 ♀, [U. S. N. M.,].
- St. Louis, Missouri, IX, 25 to X, 27, 1875 and 1876, 1 ♂, 4 ♀, [U. S. N. M.,].
- Kirkwood, Missouri, IX, 6, 1873 and X, 7, 1877, 2 ♀, [U. S. N. M.,].
- Dardanelle, Arkansas, VIII, 31, 1905, (Morse), 1 juv. ♀, [Morse Chn.,].

Conocephalus occidentalis Morse (Pl. XVI, fig. 10; XVII, 9; XVIII, 17 and 18; XIX, 13; XX, 10.)

1901. *Xiphidium occidentale* Morse,⁴¹ Can. Ent., xxxiii, p. 202. [Tehachapi, Ahwahnee, Wawona, Yosemite Valley, Berkeley, Sisson[s] and Gazelle, California; Ashland, Grant's Pass, Roseburg and Corvallis, Oregon.]
1901. *Xiphidium occidentale* variety *camurum* Morse, Can. Ent., xxxiii, p. 202. [Ashland, Oregon.]
1901. *Xiphidium occidentale* variety *caulatum* Morse,⁴² Can. Ent., xxxiii, p. 203. [Mt. Shasta district, California.]

The use of such varietal names as given above appears wholly inadvisable. The one, *camurum*, is based solely upon a macrop-

⁴¹ Single type designated: ♂; Tehachapi, California, VIII, 3, 1897, (Morse), [Morse Chn.,]. (Morse and Hebard, Proc. Acad. Nat. Sci. Phila., 1915, p. 105, (1915).)

⁴² Single type designated: ♀; Mount Shasta district, California, VII, 4, (Edwards), [M. C. Z.,]. (Morse and Hebard, Proc. Nat. Sci. Phila., 1915, p. 105, (1915).)

terous specimen of the present insect; the other, *caudatum*, on three specimens exhibiting a maximum of ovipositor length. When we consider the prevalence of macropterism and brachypterism in the species of this and many other genera, and know that such forms are often if not always the offspring of the same parent, we feel satisfied that such names are absolute synonyms, the use of which can only lead to confusion and misconception of the importance of trinomials designating valid and constant geographic races. Morse's very large series and our own specimens show considerable variation in length of ovipositor and caudal femur; the material showing the caudal femora rather short and the ovipositor rather long, named *caudatum* by Morse, is not worthy of name designation as there is no geographic correlation and such variations are frequent in the species of the genus.

The present species, although differing very decidedly in many important characters, shows much the nearest affinity to *C. nemoralis*, to which insect it also bears a closer general resemblance than to any other American species.

The great majority of specimens before us have the limbs and sides of head, pronotum and abdomen, brown; a very few examples have these portions green. The females have the abdomen usually rather distinctly marked dorso-mesad with a double row of dark markings, while on each side is situated a narrow band, usually of even darker coloration.

The lateral lobes of the pronotum are rather similar to those of *nemoralis*, but are somewhat broader, with angles more broadly rounded and humeral sinus slightly more appreciable.

Macropterism is very rare, we have examined the unique female in the Morse collection which exhibits this condition.

The genicular areas of the caudal femora are weakly or not at all infuscated; the genicular lobes of the same are unispinose in all of the specimens we have examined; the ventral margins of the caudal femora are unarmed.

The ovipositor length is as follows: Sisson, California, 14.2-15.7; Shasta County, California, 11.1; Sentinel, California, 10.3-12.6; Mariposa Grove, California, 10.1-11; Mill Valley, California, 8.7 mm. The ovipositor is usually very weakly curved but in some specimens it is almost absolutely straight.

The present species is peculiar to the Pacific coast and has been found there from Corvallis, Oregon, southward through the mountains as far as Tehachapi, California, and on the coast in the vicinity of San Francisco.

Specimens Examined: Previously recorded 156. Here recorded, 19; 7 males, 10 females and 2 immature females.

Mount Shasta, California, IX, 1885, (J. Behrens), 1 ♂, [Hebard Cln.]

Shasta County, California, VII, 1885, (J. Behrens), 1 juv. ♀; VIII to IX, 1885, (J. Behrens), 1 ♂, 1 ♀, [all Hebard Cln.]

Sisson, California, VIII, 15, 1909, (R. & H.); in grasses of marshy meadow, 4 ♂, 9 ♀, 1 juv. ♀.

Sacramento, California, VIII, 20, 1904, (M. Nawa), 1 ♂, [U. S. N. M.]

Conocephalus strictus (Scudder) (Pl. XVI, fig. 11; XVII, 10; XVIII, 19 and 20; XX, 11.)

1862. *X[iphidium] ensifer* Scudder, Bost. Journ. Nat. Hist., vii, p. 451. [Lawn Ridge, Illinois.] (In part.)

1875. *Xiphidium strictum* Scudder,⁴³ Proc. Bost. Soc. Nat. Hist., xvii, p. 160. [Dallas, Texas.]

This species averages larger and has the ovipositor averaging longer than in any other species found in the United States. Though differing very decidedly from *C. nemoralis* and *occidentalis*, the present insect shows unquestionably an extreme development from a common ancestor with these species.

In coloration the dorsum of the abdomen, the cerci and the ovipositor are dark brown, the remaining portions of the insect are green excepting the usual medio-dorsal dark stripe on the head and pronotum which is narrowly bordered with buff, in the females these narrow dorso-lateral buff lines are continued on the abdomen to the base of the ovipositor. Material from the arid southwest usually shows a decidedly paler type of coloration in which the dorsum of the abdomen is often very weakly infuscated or greenish yellow; frequently in pale females from this region the color pattern described above is strongly defined, the abdomen showing a very broad medio-dorsal fuscous band bordered by a narrow buffy band on each side, the sides of the abdomen below this infuscated, this coloration heaviest dorsad along the borders of the pale dorso-lateral bands, thus making them very pronounced.

⁴³ Single type here designated: ♀; Dallas, Texas, (Boll), [M. C. Z.]. Measurements; length of body 16.6, of tegmen 4.2, of caudal femur 16.1, of ovipositor 24.7 mm.

Lateral lobes of pronotum large, cephalic margins straight to the distinct but broadly obtuse-angulate ventro-cephalic angle, thence straight to the broadly rounded ventro-caudal angle which is approximately rectangular, caudal margin distinctly convex to the distinct humeral sinus, convex callosity very broad.

Macropterism is very rare in the present species, 11 of over 500 adult specimens at present before us represent this condition.

The genicular areas of the caudal femora are not infuscated; the genicular lobes of the same are unispinose; the ventral margins of the caudal femora are unarmed.

The ovipositor length is as follows: Mount Airy, Pennsylvania, 17.7-23.1; Fern Hill, Pennsylvania, 19.4-28.1; Marshall County, Indiana, 20.1-21.8; St. Louis, Missouri, 20.9-21.3; West Point, Nebraska, 17.7-22.8; Dodge City, Kansas, 17.9-22.6; Dickinson, Texas, 21.2-25; Beeville, Texas, 25.2-32.3; Sycamore Cañon, Baboquivari Mts., Arizona, 19.7-24.4 mm. The ovipositor usually shows a very weak curvature but in occasional specimens it is almost absolutely straight. Nowhere in the series of the present genus before us is the variability in ovipositor length more strikingly illustrated, for the range in length is from 17.7 to 32.3, showing a variation of 14.6 mm. The material before us shows that in some localities the species develops an ovipositor averaging longer or shorter than in others, but the fact is also proven by this material that nowhere in the wide distribution of the species does a recognizable geographic race occur, or even a form which might usually be distinguishable, in spite of the wide range of ovipositor length.

On the Atlantic coast the species is known from Staten Island, New York, south to Newbern, North Carolina; westward it has been taken as far north as southwestern Minnesota, other westernmost records being Hot Springs, South Dakota; Kearney, Nebraska; Syracuse, Kansas, and Cisco, Texas, while on the Rio Grande it has been taken at Brownsville and Del Rio, Texas. In the mountain regions of the arid southwest the species is again found (Marathon, Texas; Mesilla, New Mexico, and the Baboquivari Mountains, Arizona), and it will almost certainly be found to have a wide range over the highest portions of northern Mexico and for some distance along the Gulf coast of that country.

Specimens Examined: Previously recorded, over 50. Here recorded, 505; 217 males, 249 females, 4 immature males and 35 immature females.

Cornwells, Pennsylvania, IX, 7, 1911 (H.; pasture, in area of *Andropogon*), 3 ♂, 1 ♀; IX, 11, 1906, (R. & H.), 1 ♀.

Ashbourne, Pennsylvania, X, 27, 1906, (B. Long), 1 ♂, 1 ♀, [A. N. S. P.], (1 ♀ macropterous).

Mount Airy, Pennsylvania, IX, 12, 1903, (H.), 1 ♂; IX, 21, 1914, (H.; upland pasture, very abundant in *Andropogon virginicus*), 6 ♂, 10 ♀.

Tinicum Island, Pennsylvania, IX, 9, 1901, (R. & H.), 1 ♂, 1 ♀, 1 juv. ♂.

Adlington, Pennsylvania, VIII, 13, 1914, (D. Culver), 1 ♂, 2 juv. ♀, [A. N. S. P.].

Castle Rock, Delaware County, Pennsylvania, IX, 19, 1909, (R. & P.; luxuriant vegetation in deciduous forest), 1 ♂, 7 ♀, (1 ♀ macropterous).

Fern Hill, Chester County, Pennsylvania, IX, 19, 1908, (R. & H.; grasses on serpentine outcrop), 11 ♂, 13 ♀, (1 ♂ and 1 ♀ macropterous).

Marcus Hook, Pennsylvania, VIII, 11, 1905, (P. Lorrilliere), 1 juv. ♀, [A. N. S. P.].

Harrisburg, Pennsylvania, Wetzel's swamp, IX, 30, 1 ♀, [Pa. State Dept. Zool.], (macropterous).

Rockville, Pennsylvania, VII, 29, 1 juv. ♀, [Pa. State Dept. Zool.].

Ocean View, New Jersey, VII, 27, 1914, (H.; upland field), 1 juv. ♂, 3 juv. ♀; IX, 8 to X, 9, 1909 to 1911, (H. Fox), 2 ♂, 3 ♀, [A. N. S. P.].

Wildwood Junction, New Jersey, VIII, 27 to VIII, 8, 1914, (H.; in waste field particularly about bayberry bushes), 3 juv. ♂, 5 juv. ♀.

Washington, District of Columbia, VII and IX, 1883, 2 ♂, 2 ♀, [Hebard Cln.], (1 ♀ macropterous; VIII, 18 to XI, 14, (Caudell, Allard), 3 ♂, 7 ♀, [U. S. N. M.], 3 ♀ (macropterous).

Arlington, Virginia, X, 10, 1912, (Allard), 1 ♂, 2 ♀, [U. S. N. M.].

Falls Church, Virginia, IX, 4, 1906, (Caudell), 1 juv. ♀, [U. S. N. M.].

Norfolk, Virginia, IX, 8, 1903, (Morse), 2 ♂, 2 ♀, [Morse Cln.].

Virginia Beach, Virginia, IX, 7, 1903, (Morse), 1 ♀, [Morse Cln.].

Appomattox, Virginia, IX, 6, 1903, (Morse), 15 ♂, 15 ♀, 2 juv. ♀, [Morse Cln.].

Utica, Mississippi, VIII, 1 juv. ♀, [U. S. N. M.].

Lawn Ridge, Illinois, 1 ♀, one of the types of *Niphidium cusifer* Scudder, [M. C. Z.].

Urbana, Illinois, X, 15, 1905, (C. A. Hart), 1 ♂, 1 ♀, [Hebard Cln.].

Iowa City, Iowa, VIII, 1889, (B. Shimeck), 1 ♂, 1 juv. ♀, [Hebard Cln.].

Des Moines, Iowa, VIII, 26, 1903, (Caudell), 1 ♂, 1 ♀, [U. S. N. M.].

St. Louis, Missouri, IX, 25 to X, 27, 1875 and 1876, 1 ♂, 7 ♀, [U. S. N. M.]; X, 9, 1901, (C. L. Heink), 4 ♀, [Hebard Cln.].

Kirkwood, Missouri, X, 1877, 1 ♂, 3 ♀, [U. S. N. M.].

Fayetteville, Arkansas, IX, 5, 1905, (Morse), 9 ♂, 6 ♀, [Morse Cln.].

Hot Springs, South Dakota, X, 1888, 1 ♀, [Hebard, Cln.].

West Point, Nebraska, VIII to X, 1881, (L. Bruner), 3 ♂, 9 ♀, [Hebard Cln.].

South Bend, Nebraska, X, 15, 1910, (L. Bruner), 1 ♀, [Hebard Cln.].

- Weeping Water, Nebraska, IX, 29, 1909, (L. Bruner), 3 ♀, [Hebard Cln.].
 Lincoln, Nebraska, IX, 3 and 15, 1909, (L. Bruner), 3 ♂, 6 ♀, [Hebard Cln.], (1 ♀ macropterous).
 Kearney, Nebraska, VII, 27, 1910, (R. & H.; in patches of higher grasses on river bottoms), 9 ♂, 9 ♀, 2 juv. ♀.
 Howe, Oklahoma, VIII, 4, 1905, (Morse), 3 ♂, 2 juv. ♀, [Morse Cln.].
 Wilburton, Oklahoma, VIII, 27, 1905, (Morse), 7 ♂, 4 ♀, [Morse Cln.].
 South McAlester, Oklahoma, VIII, 7, 1905, (Morse), 11 ♂, 6 juv. ♀, [Morse Cln.].
 Caddo, Oklahoma, VIII, 8, 1905, (Morse), 1 ♂, 1 ♀, 1 juv. ♀, [Morse Cln.].
 Shawnee, Oklahoma, VIII, 26, 1905, (Morse), 4 ♂, 2 ♀, [Morse Cln.].
 Base of Mount Sheridan, Oklahoma, VIII, 24, 1905, (Morse), 2 ♀, [Morse Cln.].
 Cache, Oklahoma, VIII, 23, 1905, (Morse), 5 ♂, 6 ♀, [Morse Cln.].
 Mountain Park, Oklahoma, VIII, 22, 1905, (Morse), 2 ♂, 3 ♀, [Morse Cln.].
 Denison, Texas, VIII, 12, 1905, (Morse), 4 ♂, 3 ♀, [Morse Cln.].
 Wichita Falls, Texas, VIII, 15, 1905, (Morse), 4 ♂, 11 ♀, [Morse Cln.].
 Dodge City, Kansas, IX, 13, 1909, (H.; higher grasses in prairie depressions), 14 ♂, 15 ♀, (1 ♂ macropterous).
 Syracuse, Kansas, IX, 12, 1909, (R. & H.; higher grasses in prairie depressions), 1 ♂, 9 ♀.
 Plano, Texas, VIII, 1907, (E. S. Tucker), 1 ♂, [U. S. N. M.].
 Sagamore Hill, Tarrant County, Texas, IX, 27, 1912, (R. & H.), 1 juv. ♀.
 Cisco, Texas, IX, 21 and 22, 1912 (R. & H.; scarce in high meadow grasses), 2 ♂, 2 ♀.
 Flatonia, Texas, VIII, 19 and 20, 1912, (R. & H.; in bunch grass, immature specimens occasional), 1 ♀.
 Galveston, Texas, VII, 19 to 21, 1912, (H.), 3 ♂, 3 ♀.
 Virginia Point, Texas, VII, 21, 1912, (H.; in moderate numbers in weeds and tall grass growing at a level slightly higher than tidal marsh), 3 ♂, 3 ♀.
 La Marque, Texas, VIII, 22, 1912, (H.), 10 ♂, 3 ♀.
 Dickinson, Texas, VII, 20, 1912, (H.; nowhere common but widely distributed in low green plants in pine woods), 3 ♂, 8 ♀.
 Webster, Texas, VII, 19, 1912, (H.; occasional in plant clumps on prairie), 1 ♂.
 Rosenberg, Texas, VII, 25 and 26, 1912, (H.; common and widely distributed in weeds and grasses), 4 ♂, 3 ♀.
 Victoria, Texas, VII, 26 and 27, 1912, (H.; occasional in weeds), 2 ♂, 3 ♀.
 Beeville, Texas, VII, 28, 1912, (H.), 3 ♂, 3 ♀.
 Gregory, Texas, VII, 30, 1912, (H.), 2 ♂, 2 ♀.
 Robstown, Texas, VIII, 9, 1912, (H.), 1 ♂, 2 ♀.
 Lyford, Texas, VIII, 6 and 7, 1912, (R. & H.), 2 ♂, 2 ♀, 1 juv. ♀.
 Brownsville, Texas, VII, 30 to VIII, 5, 1912, (H.), 2 ♂, 2 ♀.
 Clarendon, Texas, VIII, 18, 1905, (Morse), 9 ♂, 6 ♀, [Morse Cln.], (1 ♀ macropterous).
 Amarillo, Texas, VIII, 19, 1905, (Morse), 1 ♂, [Morse Cln.].
 Del Rio, Texas, VIII, 22 and 23, 1912, (H.; area of heavy grass with clumps of cat-tails in river bottoms), 1 ♂.

Marathon, Texas, VIII, 26 and IX, 13, 1912. (R. & H.; scarce in high green grass in wet spots), 5 ♂, 3 ♀.

Boulder, Colorado, VIII, 9, 1905, (T. A. D. Cockerell), 4 ♂, 1 ♀, 4 juv. ♂, [U. S. N. M.].

Sycamore Cañon, Baboquivari Mountains, Arizona, X, 8, 1910, c. 1700 ft., (H.; common in dry grasses on cañon slopes at upper forks), 21 ♂, 23 ♀.

Conocephalus hygrophilus⁴⁴ new species (Pl. XV, fig. 9, XVI, 12; XVII, 11; XVIII, 21 and 22; XX, 12.)

This insect shows nearest relationship to *C. stictomerus*, and some affinity to *C. aigialus*, differing from the latter species in the larger size, much broader but otherwise similar vertex, deeper lateral lobes of the pronotum with the ventro-caudal angle more acute, not strikingly truncate distal extremity of the male abdomen, different male cerci and longer caudal femora. The male cerci are distinctive, the nearest development in this respect being found in *C. stictomerus*.

The species probably will be found in numerous localities in the heavier vegetation along the margins of salt marshes and about brackish and fresh water swamps on the Gulf coast, little work has as yet been done there in such environment.

Type.—♀: Virginia Point, Galveston County, Texas. July 21, 1912. (Hebard.) [Hebard Collection, Type No. 172.]

Description of Type.—Size large for the genus, form robust and rather elongate. Head with dorsum of vertex when seen from the lateral aspect not strongly but distinctly ascending above the plane of the occiput (slightly more so than in *C. aigialus* and much as in *C. stictomerus*), fastigium of vertex almost as wide as basal antennal joint, narrowing with a distinct concavity to the facial suture, when seen from front about half again as deep as wide. Eyes large for the genus and unusually protruding. When seen from above the lateral lobes of pronotum diverge rather strongly ventro-laterad; cephalic margin of lateral lobes with the ventro-cephalic angle very weakly indicated, broadly arcuate to the ventro-caudal angle which is very sharply rounded and weakly acute-angulate, caudal margin very weakly convex to the very shallow humeral sinus, convex callosity broad. Tegmina delicate in structure, elongate, reaching a little beyond tips of caudal femora; wings decidedly longer, extending beyond apex of ovipositor. Ovipositor decidedly shorter than caudal femur, broad, approximately straight in direction but showing a very evident open-sigmoid curve. Subgenital plate flat, with lateral margins convex and turned upward sharply, thus embracing the base of the ovipositor, meso-caudal portion of margin transverse. Cephalic and median limbs much as in *aigialus*, caudal limbs decidedly longer, caudal femora with ventro-external margins armed with a few small stout spines (2 and 2), genicular lobes strongly bi-spinose.

⁴⁴ From *ὕγρα* and *φίλος*, a lover of the watery ways.

Allotype.—♂; Milneburg, Orleans Parish, Louisiana. July 22, 1905. (A. P. Morse.) [Morse Collection.]

Description of Allotype.—Very similar to type, size slightly smaller. Tegmina very similar to those of *aigialus*, delicate in structure, abbreviate, reaching to base of penultimate dorsal abdominal segment, tympanum short and broad, veins and veinlets very delicate; wings slightly shorter than tegmina. Distal portion of abdomen, including cerci, raw sienna. Cerci elongate, mesal portion ovate, bulbous and swollen with that portion above ventro-proximal tooth produced in an overhanging knob-like protuberance, at the proximal base of this swelling is situated interno-ventrad a slender decurved tooth, directed mesad and nearly perpendicular to the shaft of the cercus, the external margin of which is weakly concave, beyond the mesal swelling the cercus is greatly depressed and flattened, this distal portion strongly produced with sides very weakly converging to the broadly rounded apex. Subgenital plate bearing disto-laterad short styles, the distal margin of the plate is weakly convex.

Measurements (in millimeters)

	Length of body	Length of pronotum	Length of tegmen	Length of caudal femur	Length of cercus	Length of ovipositor
♂ Milneburg, La., <i>Allotype</i> .	16.8	3.7	10.3	13.8	2	—
♀ Virginia Point, Tex., <i>Type</i> .	17.2	3.8	18.6	13.9	—	10.4

Coloration.—General color pale green (bright green in life). Eyes cinnamon brown. Dorsum of head and pronotum with a weakly indicated band of pale brown. Tegmina and wings transparent, warm buff. Distal half of male abdomen, including cerci, raw sienna; in life probably much more brilliant and approaching orange more closely in shade. In the female the abdomen at the base of the ovipositor is washed weakly with this color. Genicular areas of caudal femora yellowish.

The unique female of the present species before us is macrop-terous, while the unique male is brachypterous.

The ventro-external margins of the caudal femora are armed with small but heavy spines; in the female 2-2, and in the male 3-4.

The present species is only known from the localities given below.

Specimens Examined: 2; 1 male and 1 female.

Milneburg, Louisiana, VII, 22, 1905, (Morse), 1 ♂, *allotype*, [Morse Coll.], (brachypterous).

Virginia Point, Texas, VII, 21, 1912, (H.; in heavy grasses on edge of salt marsh), 1 ♀, *type*, (macrop-terous).

Conocephalus stictomerus⁴⁵ new species (Pl. XV, fig. 10; XVI, 13; XVII, 12; XVIII, 23 and 24; XX, 13.)

1911. *Conocephalus cusiferus* Rehn and Hebard (not *Xiphidium cusifer* Scudder, 1862), Proc. Acad. Nat. Sci., Phila., 1910, p. 613. (In part.) [Macropterous pair; Raleigh, North Carolina.]

The above error was a result of the specimens being in a very bad state of preservation, combined with the fact that at the time many of the characters of the greatest importance in distinguishing the North American species of the genus remained unstudied.

This species shows a development almost intermediate between *C. hygrophilus* and *C. aigialus*, but differs from both of these species in the very much narrower vertex, in the male cerci which are similar to those of *hygrophilus* but distinctly less specialized, and in the ovipositor which is very decidedly longer than the maximum found in either of the above mentioned forms. The coloration is very distinctive, no approach to it being found in any of the known species of the genus.

The present insect inhabits the middle Atlantic coastal plain, where it is to be found in the luxuriant grasses growing about the borders of marshes near fresh and brackish water.

Type.—♂; Cedar Springs, Cape May County, New Jersey, August 26, 1914. (Hebard.) [Hebard Collection, Type No. 173.]

Description of Type.—Size rather large for the genus, form rather slender. Head with dorsum of vertex when seen from the lateral aspect distinctly ascending above the plane of the occiput (much as in *C. hygrophilus* and more so than in *C. aigialus*), fastigium of vertex narrow, very little more than half as wide as the basal antennal joint, narrowing with a scarcely appreciable concavity to the facial suture, when seen from front over twice as deep as the greatest width. Eyes normal in size but unusually protruding. Pronotum moderately constricted, with lateral lobes narrower than in *C. hygrophilus* and *C. aigialus*, similar in this respect to *C. brevipennis*, cephalic margin nearly straight, ventrocephalic angle very broadly rounded obtuse-angulate, ventral margin very weakly concave to the broadly rounded but acute-angulate ventro-caudal angle, caudal margin weakly convex to the very shallow humeral sinus, convex callosity very narrow. Tegmina delicate in structure, abbreviate, reaching to middle of penultimate dorsal abdominal segment, tympanum much as in *brevipennis*: wings slightly shorter than tegmina. Cerci elongate, mesal portion with proximal section enlarged and produced above ventro-proximal tooth in an overhanging heavy knob-like protuberance, at the base of this swelling is

⁴⁵ From *στικτός*=spotted and *μυρός*=thigh, in allusion to the remarkable spots and dots of coral red found on the thighs of individuals of this species during life.

situated a slender decurved tooth which is, however, broad at its base, this tooth directed mesad and nearly perpendicular to the shaft of the cercus, the external margin of which is weakly angulato-concave, beyond the proximo-mesal swelling the cercus is greatly depressed and flattened particularly on the inner side, this distal half strongly produced with sides very weakly converging to the broadly rounded apex. Subgenital plate bearing disto-laterad very short styles, distal margin of the plate very weakly convex, nearly transverse. Cephalic and median limbs much as in *brevipennis*, caudal limbs decidedly longer, caudal femora with ventro-external margins armed with a number of small stout teeth (3 and 3), genicular lobes strongly bispinose. Coloration of insect distinctive and striking.

Allotype.—♀; data same as the type.

Description of Allotype.—Similar to type, very slightly larger. Tegmina lanceolate with rather sharply rounded apex, half as long as abdomen; wings slightly shorter. Ovipositor distinctly but not decidedly longer than caudal femur, broad, approximately straight in direction but showing a very evident open-sigmoid curve. Subgenital plate similar to that of *hygrophilus*. Coloration distinctive and striking as in type.

♂	<i>Measurements (in millimeters)</i>				
	Length of body	Length of pronotum	Length of tegmen	Length of caudal femur	Length of cercus
Cedar Springs, N. J., <i>Type</i>	14.4	3.2	8.7	12.4	2
Cedar Springs, N. J., <i>Paratypes</i>	13.4-14.4	3-3.3	8-9.2	12.3-13.7	1.9-2.1
Chestertown, Md.....	12.4-13.6	2.9-3	8.7-11.6	13-13.8	2-2.2
Raleigh, N. C.....	14.9-15	3.4-3.5	18.3-18.4	14-15.1	2.1-2.2
♀	<i>Length of ovipositor</i>				
Cedar Springs, N. J., <i>Allotype</i>	15.3	3.3	9.8	14.7	15
Cedar Springs, N. J., <i>Paratypes</i>	11.1-16	2.9-3.4	6.9-9.8	12.6-14.7	13.7-15.1
Chestertown, Md.....	13.4	3.7	7.8	15.3	18.1
Churchland, Va.....	14.5	3.7	9.2	15.6	19.8
Raleigh, N. C.....	14.3-15.5	3.4-3.6	18.3-18.8	14.3-15.2	16.1-16.7

Coloration.⁴⁶—Lower portions of lateral lobes of pronotum, all of thorax, proximal two-fifths of male abdomen and all femora lettuce green. In life the swollen portions of the caudal femora

⁴⁶The material upon which these color notes are based was, when fresh, kept in a 3% solution of formaldehyde for about ten hours. This treatment has preserved the green coloration almost in its entirety, but the other delicate colors are not as brilliant as in life and the coral red spots of the caudal femora have wholly disappeared. Still weaker solutions of formaldehyde, applied for a longer time, may be found to hold these evanescent colors. At present our experiments are preliminary but have shown a definite improvement over simply drying the material.

are strikingly marked with irregularly placed spots and dots of coral red; these in the immature condition are much darker, reddish brown in color, and are still evident in dried material. Tibiae green, much suffused with brown. Face capucine orange with a median vertical stripe of mahogany red extending from the vertex to the base of the clypeus, genae clouded with mahogany red. Dorsum of head and pronotum with a broad median band of mahogany red, the remaining lateral portions of the occiput and pronotum including the upper portions of the lateral lobes capucine buff, the area between this and the green portion of the lateral lobes clouded with mahogany red. Eyes very deep mahogany red. Tegmina and wings transparent, salmon buff. Distal three-fifths of male abdomen, including cerci, orange rufous. Abdomen and ovipositor of female sudan brown, shaft of latter washed with green. Genicular areas of caudal femora suffused with reddish brown.

The material before us shows little local size variability; in southward distribution there is a slight increase in size.

All of the specimens before us from New Jersey and Maryland are brachypterous, while those from North Carolina are all macropterous.

The ventro-external margins of the caudal femora are armed with small but heavy spines, (approximate average, three and four); these are found in the thirty-two perfect specimens before us as follows:

Number of spines,	0-0	0-1	1-2	2-2	2-3	2-4	2-5	3-3
Number of specimens,	1	1	1	3	1	1	2	7
Number of spines,	3-4	3-5	3-6	3-7	4-4	4-5	5-5	6-6
Number of specimens,	3	2	1	1	3	3	1	1

The series from which the present species is described was taken in a heavy growth of panic grass (*Panicum virgatum*), one to one and one-half feet high, interspersed with various marsh plants in a limited marshy area on the border of a brackish stream. Two hours strenuous and continuous beating was necessary to secure the series, as the species was very scarce. Though not unusually active in their movements, the insects proved to possess extreme facility in concealing themselves. The species is known to range from Cedar Springs, New Jersey, to Raleigh, North Carolina.

Specimens Examined: 42; 17 males, 23 females and 2 immature females.

Cedar Springs, New Jersey, VIII, 14, 1914, (II.; in high marsh grass), 1 juv. ♀; VIII, 26, 1914, (II.; in high marsh grass), 12 ♂, 13 ♀, 1 juv. ♀, *type, allotype* and *paratypes*, [Hebard Ch.].

Chestertown, Maryland, VIII, 19 and 23, 1899, (E. G. Vanatta), 2 ♂, 1 ♀, [A. N. S. P.].

Churchland, Virginia, VIII, 8 and IX, 15, 1914, (H. Fox; in brackish marsh, one in *Spartina glabra*), 2 ♀, [Fox Ch.].

Raleigh, North Carolina, VIII, 6 and 16, 1904, (C. S. Brimley; light at night), 1 ♂, 1 ♀, [Hebard Ch.]; IX, 9 and 16, 1905, (C. S. Brimley), 2 ♂, 6 ♀, [U. S. N. M.], (all macropterous).

Conocephalus aigialus⁴⁷ new species (Pl. XV, fig. 7; XVI, 14; XVII, 13; XVIII, 25 and 26; XX, 14.)

1907. *Xiphidion nigropleurum* (?) Rehn and Hebard (not *Xiphidion nigropleurum* Bruner, 1891), Proc. Acad. Nat. Sci. Phila., 1907, p. 313. (In part.) [1 ♀; Pablo Beach, Florida.]

1911. *Conocephalus brevipennis* Rehn and Hebard (not *Xiphidion brevipennis* Scudder, 1862), Proc. Acad. Nat. Sci. Phila., 1910, p. 643. (In part.) [1 ♂; Cape Henry, Virginia.]

As noted above the present authors have twice failed to recognize single specimens of the present species as distinct from the then known species. This was chiefly due to the fact that scarcely any material from the salt marshes of the Atlantic coast was then available, and, in a genus showing such great variability as the present, no definite knowledge of the forms already described and the number of species really present could be gleaned from the inadequate series at that time in hand.

The present species bears a slight superficial resemblance to *C. brevipennis* and *C. spartinae*, but may at once be separated from these by the decidedly more robust and compact structure, unusually prominent eyes, heavy truncate distal portion of the male abdomen, which in life is a bright and striking yellow and bears concolorous cerci which are distinctive (but plainly a development of the type found in *C. stictomerus* and *C. hygrophilus*), broad and weakly sigmoid ovipositor, and short, heavy limbs with the ventro-external margins of the caudal femora bearing normally a number of heavy spines.

Along the coast of Georgia and Florida, where *spartinae* is also found in the salt marshes, the present insect averages decidedly larger in size than that species.

⁴⁷ From *αιγιαλός*=the sea shore.

As its name implies the present insect inhabits salt marsh vegetation, on the beaches and along the tidal rivers of the Atlantic coast, where its habits are very similar to those of *spartinae*; in the present case, however, the insect is found not out on the marshes but in the halophytic vegetation along their borders and in similar vegetation on the beaches.

Type.—♂; Wrightsville, New Hanover County, North Carolina. September 7, 1911. (Rehn and Hebard.) [Hebard Collection, Type No. 174.].

Description of Type.—Size medium, form robust and compact. Head with dorsum of vertex when seen from the lateral aspect distinctly though slightly ascending above the plane of the occiput, fastigium of vertex narrow, little more than half as wide as the basal antennal joint, narrowing with a scarcely appreciable concavity to the facial suture, when seen from front over twice as deep as the greatest width. Eyes large for the genus and unusually protruding. Pronotum short with lateral lobes diverging rather strongly ventro-laterad, lateral lobes with cephalic margin broadly and evenly arcuate to the ventro-caudal angle which is rather sharply rounded and nearly rectangular, caudal margin very weakly convex to the very shallow humeral sinus, convex callosity broad. Tegmina delicate in structure, abbreviate, reaching to base of penultimate dorsal abdominal segment; tympanum small, short and broad; veins and veinlets very delicate, more so than in *brevipennis*. Wings slightly shorter than tegmina. Abdomen with distal extremity enlarged and truncate, distal half including cerci bright and striking yellow in life. Cerci short, bulbous and swollen mesad in a large and nearly circular area at the proximal base of which is situated a slender ventro-internal tooth directed mesad and nearly perpendicular to the shaft of the cercus, the external margin of which is very weakly concave, beyond the mesal swelling the cercus is greatly depressed, this distal portion with sides rapidly and evenly converging to the rather sharply rounded apex. Subgenital plate bearing disto-laterad very short styles, the distal margin of the plate is very weakly convex, nearly transverse. Limbs shorter and heavier than in *spartinae* or *brevipennis*, caudal femora with ventro-external margins armed with a number of small stout teeth (5 and 5), genicular lobes strongly bispinose.

Allotype.—♀; data same as the type.

Description of Allotype.—Very similar to type, size somewhat larger. Tegmina lanceolate, tapering to the very sharply rounded apex, reaching to distal third of abdomen. Ovipositor distinctly but not decidedly shorter than caudal femur, broad, approximately straight in direction but showing a very evident open-signoid curve. Subgenital plate flat, with lateral margins turned upward sharply and embracing the base of the ovipositor, distal margin of flat surface transverse.

<i>Measurements (in millimeters)</i>					
	Length of body	Length of pronotum	Length of tegmen	Length of caudal femur	Length of cercus
♂					
Cape Henry, Va.	12.6	3.1	8.6	11.9	1.8
Wrightsville, N. C., <i>Type</i>	12.9	3.1	7.3	10.9	1.8
Wrightsville, N. C., <i>Paratypes</i>	11.9-13.7	3.1-3.4	6.8-8.3	10.7-12.3	1.6-1.9
Tybee Island, Ga.	14.2-15.2	3.3-3.8	8.2-9.6	12.2-13.3	1.8-2
South Jacksonville, Fla.	13.6-14.9	3.7-3.8	16-17.7	12.6-13	1.9-2
♀					
Wrightsville, N. C., <i>Allotype</i>	13.7	3.4	7.8	12.2	10.7
Wrightsville, N. C., <i>Paratypes</i>	11.6-15.8	3.2-3.8	7.1-7.4	12.1-13.2	10.6-10.8
Tybee Island, Ga.	14-15.9	3.7-4.3	7.2-9.3	12.7-15	10.7-11.7
South Jacksonville, Fla.	15.3-17.2	3.8-4.3	18.1-19.7	14-14.4	11.9-13.7
South Jacksonville, Fla.	16.3	4.1	9.7	15	12.8
Pablo Beach, Fla.	15.2	4.1	10.6	15.3	13.4

Coloration.—General color pale green (bright green in life). Dorsum of head and pronotum with a broad median band of cinnamon brown. Eyes natal brown to ecru drab (in life sometimes orange buff). Tegmina and wings transparent, light buff. Distal half of male abdomen, including cerci, orange buff (brighter and very striking in life), in living females the abdomen at the base of the russet ovipositor is usually washed with this color. Genicular areas of caudal femora frequently very weakly suffused with brown.

A distinct increase in size in the southward distribution of the species is noted, but each large series shows a decided amount of local size variability as well.

Macropterism is found in two males and three females from the vicinity of Jacksonville, Florida, out of the thirty-four specimens before us.

The degree of production of the distal portion of the male cerci is found to be occasionally variable.

The ventro-external margins of the caudal femora are armed with small but heavy spines, in number averaging four and five;

these are present in the twenty-nine perfect specimens before us as follows:

Number of spines,	1-4	2-2	3-4	3-5	3-6	4-4
Number of specimens,	1	1	2	2	2	2
Number of spines,		4-5	4-6	5-5	5-6	5-7
Number of specimens,		9	1	5	3	1

The present species is found in salt marsh vegetation on the beaches and along the tidal rivers of the Atlantic coast from Cape Henry, Virginia, to Pablo Beach, Florida.

Specimens Examined: 34; 14 males and 20 females.

Cape Henry, Virginia, VIII, 18, 1908, (R.; in dune vegetation on beach), 1 ♂, Oceanview, Virginia, VIII, 9, 1904, (Caudell), 1 ♀, [U. S. N. M.].

Wrightsville, North Carolina, IX, 7, 1911, (R. & H.; in undergrowth near beach and under live oaks in grass on edge of marsh), 5 ♂, 8 ♀, *type, allotype* and *paratypes*.

Tybee Island, Georgia, VIII, 12 and 13, 1903, (Morse), 3 ♂, 6 ♀; IX, 2, 1911, (H.; occasional along edge and in borders of salt marsh in high grasses), 6 ♂, 6 ♀.

Jacksonville, Florida, (T. J. Priddey), 1 ♀, [Hebard Cln.], (macropterous).

South Jacksonville, Florida, IX, 6 and 7, 1913, (W. T. Davis), 2 ♂, 3 ♀, [Davis Cln.], (2 ♂, 2 ♀ macropterous).

Pablo Beach, Florida, VIII, 11, 1905, (R. & H.), 1 ♀.

Conocephalus nigropleurum (Brumer) (Pl. XVI, fig. 15; XVII, 14; XVIII, 27 and 28; XIX, 14; XX, 15.)

1891. *Xiphidium nigropleurum* Brumer,⁴⁸ Can. Ent., xxiii, p. 58. [Eastern Nebraska to Antelope County.]

1898. *Xiphidium nigropleura* Scudder, Can. Ent., xxx, p. 184. (Emendation, in key to species.)

The coloration of the present insect makes it the most beautiful, and one of the most distinctive in appearance, of the North American forms. The margins of the lateral lobes and of the dorsum of the pronotum, the limbs, tegmina and cerci are a rich and vivid green; the face and genae, sides of body just below proximal portion of the tegmina and median areas of the lateral lobes and the dorsum of the pronotum, are dark brown; the dorsal surface of the head is marked with a median black line, the portions between this and the eyes are yellowish brown. The abdomen is shining black, the dorsum of the same sometimes dark brown, particularly in females.

⁴⁸ Single type selected by Rehn and Hebard, Proc. Acad. Nat. Sci. Phila., 1912, p. 124, (1912).

Lateral lobes of pronotum ample (larger than in *C. attenuatus*), cephalic margin straight to the distinct but broadly obtuse-angulate ventro-cephalic angle, thence straight to the rather narrowly rounded ventro-caudal angle which is less than 90° (not as narrow as in *attenuatus*), caudal margin nearly straight, almost imperceptibly convex to the very weakly defined humeral sinus, convex callosity narrow but distinct.

Three females are macropterous in the series of ninety-two specimens of the present species which we have examined.

When compared with those of *attenuatus*, the male cerci are found to be of similar general type but decidedly straighter and less attenuate; the swollen portion is shorter and larger and the distal portion is shorter, moderately but distinctly depressed and not directed outward, the tooth is in the same position but has its base broader and more flattened.

The caudal femora are rather long but with the proximal portion well developed; the genicular areas of the same are occasionally infuscated, while the genicular lobes are bispinose.

The ventro-external margins of the caudal femora are armed as follows in forty-seven perfect specimens examined:

Number of spines,	0-3	1-2	1-3	1-4	2-2	2-3	2-4
Number of specimens,	1	3	4	1	5	8	2
Number of spines,	3-3	3-4	4-4	4-5	4-6	5-5	
Number of specimens,	8	10	1	2	1	1	

The present species is found in the upper Mississippi valley region and northward to Ithaca, New York; extreme southwestern Ontario; Gun Lake, Michigan, and Lone Rock, Wisconsin: in western distribution it will probably not be found to occur far west of the well watered portions of eastern Nebraska (Halsey being the westernmost record) and in eastward distribution it is probably limited by the Appalachians.

Specimens Examined: Previously definitely recorded, 16. Here recorded, 76; 34 males, 29 females, 6 immature males and 7 immature females.

Ithaca, New York, VIII, 22 and 25, 1891, (Morse), 15 ♂, 12 ♀, 2 juv. ♀, [Morse Clu.]; VIII, 4 to X, 12, 1885 to 1912, 13 ♂, 11 ♀, [Cornell Univ.], (1 ♀ macropterous); VI, 28 to VIII, 4, 1885 and 1887, 6 juv. ♂, 3 juv. ♀, [Cornell Univ.].

Gun Lake, Michigan, VIII, 13 to 26, 1912, (M. A. Carriker, Jr.), 1 ♂, 1 ♀, Hebard Clu.].

Lone Rock, Wisconsin, VIII, 12, 1906, (J. D. Hood), 1 ♀, [Pa. State Dept. Zool.].

Denison, Iowa, VII, 20, (J. A. Allen), 1 ♀, [M. C. Z.].

West Point, Nebraska, VIII and IX, 1884 and 1887, (Bruner), 5 ♂, *type* and *paratypes*, [Hebard Cln. and A. N. S. P.].

Lincoln, Nebraska, VIII and IX, 1888, (Bruner), 2 ♀, *allotype* and *paratype*, [Hebard Cln.], (1 macropterous).

Halsey, Nebraska, VII, 12, 1909, (R.; in grasses on river plain), 2 juv. ♀.

Watertown, Illinois, VIII, 9, (McNeill), 1 ♀, [M. C. Z.].

Conocephalus attenuatus (Scudder) (Pl. XVI, fig. 16; XVII, 15; XVIII, 29 and 30; XX, 16.)

1869. *Xiphidium attenuatum* Scudder,⁴⁹ Trans. Am. Ent. Soc., ii, p. 305, [Illinois.]

1891. *Xiphidium* sp.? McNeill, Psyche, vi, p. 24. [Illinois.]

1891. [*Xiphidium*] *lancoletatum* Bruner, Can. Ent., xxiii, p. 59. (Nomen nudum.)

1892. *Xiphidium scudderi* Blatchley, Can. Ent., xxiv, p. 26. [Vigo County, Indiana.]

1892. [*Xiphidium*] *lancoletatum* Bruner, Ent. News, iii, p. 265. (Explanation of nomen nudum.)

Blatchley states, in 1903, that his *scudderi* was based upon the brachypterous condition of the present species.⁵⁰ This is true, and the name is consequently placed in the synonymy here without reservation.

The position of the present species is in group C of the subgenus *Xiphidium*, between *C. nigropleurum* and *C. nigropleuroides*. The form and length of the ovipositor in the female, and cercal characters in the male, afford features by which the species can be readily distinguished. The coloration and color pattern is also distinctive; the color pattern, however, showing a closer similarity to that of *nigropleuroides* than to any other form.

The face is warm buff with median portion mahogany red, radiating below to form a dark suffusion on the genae and extending upward on the sides, thus enveloping the postocular region; the lateral lobes of the pronotum, excepting the dorsal margin, are of the same color, while the medio-dorsal stripe of head and pronotum is somewhat darker. The remaining portions of the head, broad margins of the medio-dorsal stripe of head and pronotum, and the limbs, are warm buff, the femora very finely speckled with mahogany red. In the male, the abdo-

⁴⁹ The type of this species has been destroyed.

⁵⁰ Orth. of Indiana, p. 379.

men is amber brown with cerci slightly paler and more buffy; in the female, the abdomen is mahogany red with narrow and much interrupted dorso-lateral paler bands weakly suggested while the ovipositor is cinnamon brown.

Lateral lobes of pronotum moderately large with ventral margin and particularly ventro-caudal angle distinctly curved outward; cephalic margin broadly convex, with ventro-cephalic angle subobsolete, to the very sharply rounded ventro-caudal angle which is distinctly less than 90° , caudal margin nearly straight, almost imperceptibly convex, to the very weakly defined humeral sinus, convex callosity very narrow, subobsolete.

But seven of the series of sixty-five specimens here recorded are macropterous.

The male cerci are of a type almost intermediate between those of *C. nigropleurum* and *C. spartinae*: when compared with those of the latter species they are seen to be decidedly more ample and somewhat heavier, with tooth slightly heavier and directed proximad at a sharper angle; the externo-lateral margin is more concave than in either of the above species. An abnormality, which we have never before seen, is found in a single male from Cornwells, Pennsylvania; this specimen is adult, but the cerci have remained as in the instar preceding maturity.

The ovipositor is very gently curved upward, tapering very gently distad to the sharp apex, with greater portion of dorsal margin and distal portion of ventral margin supplied with widely spaced microscopic serrulations, a condition not found in any other species of the present genus here considered, but the normal condition in the genus *Orchelimum*. The ovipositor length is as follows: Cornwells, Pennsylvania, 24.6-27.5; Vigo County, Indiana, 23.4-26.2; West Point, Nebraska, 19.9-26.3; Lincoln, Nebraska, 25.4-27.8 mm.

The genicular areas of the caudal femora are not darkened and the genicular lobes of the same are normally strongly bispinose, occasionally unispinose. The caudal femora are long and slender and have the ventro-external margins armed as follows in 54 perfect specimens examined:

Number of spines,	0-0	0-1	0-2	1-1	1-2	1-3	1-4	2-2
Number of specimens,	3	2	2	4	10	4	1	5

Number of spines.	2-3	2-4	3-3	3-4	3-5	4-4	4-5
Number of specimens.	9	1	4	5	1	1	2

Two examples have the ventro-internal margins of these femora armed with 0-1 and one with 1-2 spines, this is a very unusual condition found elsewhere in the North American species even more rarely in *C. fasciatus* alone.

On a special excursion to Cornwells, Pennsylvania, undertaken to secure a series of this species, it was found very scarce in high grasses, (*Panicum virgatum*), and plants along the shore of the Delaware river, and in moderate numbers in a small marshy area, particularly in a restricted growth of low marsh grass, (*Panicularia septentrionalis*). The males were usually found in the grass or perched on nearby plant leaves, whence they sprang away with alacrity. The females were never as conspicuous and sprang away with great swift leaps, then, hiding on the opposite sides of grass stems and leaves in the deepest tangles of vegetation, they proved very difficult to locate. The species may be said to be easily the most alert and active of the genus found about Philadelphia. Over its wide distribution it is doubtless restricted to damp spots and marsh areas.

The present species is known from Ithaca, New York, and the vicinity of Philadelphia, Pennsylvania, westward to eastern Nebraska and Kansas; it apparently enjoys the most general distribution in the region south of the Great Lakes, and is probably very local and usually scarce everywhere east of the Appalachians. The most northern records are extreme southwestern Ontario (Rondeau and Point Pelee) and Minnesota.

Specimens Examined: Previously recorded, 15. Here recorded, 65: 28 males, 34 females, 1 immature male and 2 immature females.

The Cove, Ithaca, New York, X, 27, 1912, 2 ♂, 3 ♀, [Cornell Univ.].

Cornwells, Bucks County, Pennsylvania, IX, 7, 1914, (H.), 25 ♂, 14 ♀, 1 juv. ♂, 1 juv. ♀; X, 11, 1906, (R. & H.), 1 ♀.

Philadelphia, Pennsylvania, 1897, (C. W. Johnson), 1 ♀, [Morse Cln.], (macropterous).

Harrisburg, Pennsylvania, VIII, 19, 1 juv. ♀, [Pa. State Dept. Zool.].

Watertown, Illinois, VIII, 23, (McNeill), 1 ♀, [M. C. Z.].

West Point, Nebraska, IX, 1885, (Brumer), 11 ♀, [Hebard Cln.], (4 macropterous).

Lincoln, Nebraska, VIII, (1 ♀ macropterous collected at light), 1 ♂, 3 ♀, [Hebard Cln.], (1 ♂, 1 ♀ macropterous).

Conocephalus nigropleuroides (H. Fox) (Pl. XVI, fig. 17; XVII, 16; XIX, 1 and 2; XX, 17.)

1907. *Xiphidium nigropleurum* (?) Rehn and Hebard (not *Xiphidium nigropleurum* Brumer, 1891), Proc. Acad. Nat. Sci. Phila., 1907, p. 313. (In part.) [Cedar Keys, Florida.⁵¹]

1912. *Xiphidium nigropleuroides* H. Fox,⁵² Ent. News, xxiii, p. 116, Pl. IX, figs. 1 to 5. [Cape May County, New Jersey.]

The present insect resembles *C. spartinae* more closely than any other species in the form of the male cerci. The color pattern, though distinctive, shows the nearest similarity to that of *C. attenuatus*. The shades of color in this insect, particularly striking and brilliant in life, are not found in any other North American species. The species, though decidedly smaller and more slender than *spartinae* in New Jersey, increases southward in size and robustness to a very decided degree, as does *spartinae* in size to a considerably less extent; so that in material of the two species from Florida, the present insect is distinctly the larger and more robust of the two. The variation in shape of the ovipositor is far greater in *nigropleuroides* than in any other American species of the genus.

The medio-dorsal stripe of head and pronotum is blackish-brown; the face, postocular portion of genae and lateral lobes of pronotum very dark brown, these markings giving the insect a trifasciate appearance. This is greatly intensified by the pale coloration of the intervening portions of head and pronotum, which are cream color. In fresh material the tegmina, limbs and male cerci are very bright sea green, or grass green in some series, while the distal portion of the male abdomen is brilliantly marked with orange. In the female this latter color is weaker and occupies a decidedly lesser area. The brightest colors in this insect are unusually hard to preserve, only traces of the same remaining in the majority of dried specimens before us.

Lateral lobes of pronotum with cephalic margin broadly convex to the ventro-caudal angle, with ventro-cephalic angle weakly defined and ventral margin often irregular and slightly concave before the ventro-caudal angle which is broadly rounded, angu-

⁵¹ The authors' record of a single specimen of this species from Gainesville, Florida, is here corrected as it is due to a mistake in labelling, the specimen having been taken at Cedar Keys, Florida, the day previous.

⁵² Single type selected by H. Fox, Ent. News, xxiii, p. 232, (1912).

lation of same a little less than 90° , caudal margin rather irregularly convex to the rather weak humeral sinus, convex callosity moderately but not decidedly broad. As in *attenuatus*, the ventral margin and particularly the ventro-caudal angle is sharply but narrowly curved outward.

Macropterism is found in but four females, all from Cumberland Island, Georgia, in the series of over one hundred and sixty-eight specimens before us.

When compared with *spartinae*, the male cerci are found to be very similar but more attenuate and slightly irregular in outline, this irregularity giving the organs the appearance of being a little malformed.

The ovipositor is normally rather broad and approximately straight in direction with a weak open-sigmoid curvature. In the series of eight specimens from Cedar Keys, Florida, we find this type in three, and a distinctly though not strongly upward curved type in five, the ovipositor in these being broader and showing an even greater curvature than is normal in *spartinae*. The development of two distinct types of ovipositor in the same species at one locality is a problem which we have also encountered in *Orchelimum concinnum*. The females here considered belong without the slightest doubt to the same species and the cause of this varied development is yet highly problematical. Elsewhere in the species of the genus some individual variation naturally occurs in degree of curvature and heaviness of the ovipositor, but the appearance here of two distinct types, elsewhere of decided importance and value as specific characters, is very surprising. Differentiation in method of oviposition and selection of certain different plants for this purpose has probably been a major factor in the development of the different types of ovipositor now to be found in various species of the genus, but when two distinct types are found in the same species it would lead one to suppose them to be the result of these same factors. The difficulty is that with such development the different forms have as a rule developed into distinct species, which in the present instance is not the case. The ovipositor length is as follows: Ventnor, New Jersey, 10.7-12; Ocean View, New Jersey, 11.1-12.8; Ocean View, Virginia, 12.7-13.8; Wrightsville, North Carolina, 11.4-12; Cumberland Island,

Georgia, 13.9-15.9; Cedar Keys, Florida, open-sigmoid, 13.2-14.1, arcuate, 12.4-14.6 mm.

The genicular areas of the caudal femora are not darkened, the genicular lobes are normally bispinose but occasionally unispinose; the caudal femora are elongate but with the proximal portion more swollen than in *spartinae*, the ventro-external margins are unarmed in all but two of the ninety specimens from New Jersey before us, in the more southern material these margins are armed as follows in forty-one perfect specimens examined:

Number of spines,	0-0	0-1	0-2	1-1	1-2	2-2
Number of specimens,	24	6	5	3	1	2

The present insect appears to be absolutely limited in distribution to the salt-marsh tidal flats. It is known from Ventnor, New Jersey, to Cumberland Island, Georgia, on the Atlantic Coast, and from Cedar Keys, Florida, on the Gulf coast.

Specimens Examined: Previously recorded, over 30. Here recorded, 138; 67 males, 54 females, 5 immature males and 12 immature females.

Ventnor, New Jersey, VIII, 5, 1914, (H.; very abundant in high *Spartina stricta* and in nearby *Spartina patens*, many immature individuals but few adults), 40 ♂, 22 ♀, 5 juv. ♂, 12 juv. ♀.

Ocean City, New Jersey, VIII, 14, 1914, (H.; occasional in *Spartina stricta* far out on tidal marsh), 5 ♂, 4 ♀.

Cape May Court House, New Jersey, VIII, 14, 1914, (H.; scarce in *Spartina stricta* far out on tidal marsh), 2 ♂.

Oceanview, Virginia, VIII, 9, 1904, (Caudell), 2 ♀, [U. S. N. M.].

Wrightsville, North Carolina, IX, 7, 1911, (H.; along tidal channels on salt marsh), 1 ♂, 4 ♀.

Cumberland Island, Georgia, VIII, 31, 1911, (H.; in fringing tidal salt marsh), 12 ♂, 14 ♀, (4 ♀ macropterous).

Cedar Keys, Florida, VIII, 15, 1905, (H.; in tidal salt marsh), 7 ♂, 8 ♀.

Conocephalus spartinae (H. Fox) (Pl. XVI, fig. 19; XVII, 17; XIX, 3 and 4; XX, 18.)

1862. *Xiphidium brevipennis* Scudder (not *Xiphidium brevipennis* Scudder, August and September, 1862), Bost. Journ. Nat. Hist., vii, p. 451. November, 1862. (In part.) [Cape Cod, Massachusetts.]

1902. *Xiphidium nemorale* Rehn (not *Xiphidium nemorale* Scudder, 1875), Ent. News, xiii, p. 315. [Atlantic City, New Jersey.]

1904. *Xiphidium brevipenne* Rehn (not *Xiphidium brevipennis* Scudder, 1862), Ent. News, xv, p. 330. (In part.) [Atlantic City and Cape May, New Jersey.]

1912. *Xiphidium spartinae* H. Fox,⁵³ Ent. News, xxiii, p. 111, pl. VIII, figs. 1 to 6. [Wood's Hole, Massachusetts; salt marshes of southern New Jersey.]

⁵³ Single type selected by H. Fox, Ent. News, xxiii, p. 232, (1912).

The descriptions by Fox of this species and *C. nigropleuroides* are complete, thorough and very different from the usual careless and insufficient descriptions of the species of the present genus.

The present species bears a very decided general resemblance to *C. brevipennis*, so close that, until studied by Fox, virtually all of the material in collections had been confused with that species. When compared with *brevipennis*, we find that *spartinae* differs signally in the male cerci, while females may usually be separated by the ovipositor which normally shows a very weak but appreciable curvature, this appendage in *brevipennis* being normally straight. In addition, material of the present species from the North Atlantic coast is small and more slender than *brevipennis*, but in southward distribution it attains a size quite as great as the largest examples of that species. The pronotum is much as in *brevipennis* but has the lateral lobes not quite as deep with the ventro-caudal angle rather sharply rounded, the tegmina are more delicate (not quite as delicate as in *C. aigialus*), with the male tympanum having the stridulating vein distinctly longer, this area being slightly more transverse in proportion to the length than in *brevipennis*—this is true of *aigialus* which, however, has the tympanal area appreciably smaller. The distinctive male cerci show at once that the position of the species is in group C, while *brevipennis* belongs to group A. These cerci are slender and symmetrical, an elongate bulbous swelling occupies the mesal half, at the base of which is situated interno-ventrad a small slender tooth directed mesad with a very weak inclination proximad, the external margin of the cercus is moderately concave, beyond the bulbous area the cercus is weakly depressed, this distal portion with sides subparallel to the broadly rounded apex. These cerci differ from those of *brevipennis* not only in shape but in coloration as well, being bright green except in the darkest individuals in which they are pale olive.

In coloration, material from New Jersey often shows an intensive condition, in this the medio-dorsal stripe of the head and particularly the pronotum is very broadly margined by pale buff, and below this the lateral lobes of the pronotum are marked

with a postocular reddish brown suffusion; no examples of such coloration are found in southern material. In *brevipennis*, when the lateral lobes of the pronotum are suffused with a darker color, this color usually extends upward nearly to the medio-dorsal stripe of the dorsum, as the pale margins of this stripe are normally very narrow in that species, and as a result the intensive types of coloration in the two species are normally distinctly different in appearance. In general coloration, with the exception of the differences mentioned above and the green male cerci, this species agrees with *brevipennis*.

The genicular areas of the caudal femora are normally not darkened, in occasional specimens they are weakly infuscated; the genicular lobes of the same are normally bispinose, rarely they are found to be unispinose, while a single female (Wesquage Beach, Rhode Island) has one genicular lobe trispinose; the ventro-external margins of the caudal femora are armed in one hundred and eighty-one perfect specimens examined as follows:

Number of spines,	0-0	0-1	0-2	0-3	1-1	1-2	1-3	1-4
Number of specimens,	15	32	12	2	20	40	10	2
Number of spines,		2-2	2-3	2-4	2-5	3-3	3-4	4-4
Number of specimens,		20	16	4	1	3	3	1

Macropterism is very rare in material from the Atlantic coast, but appears to be of frequent occurrence on the Gulf coast. As there is a gradual but not decided increase in size southward in the distribution of the species, we find such macropterous examples from the Gulf coast to be, in general appearance only, very similar to *C. fasciatus*.

The ovipositor is very weakly curved upward but varies to an almost straight condition; specimens showing the extreme of this variation are often frequently difficult to separate from females of *brevipennis*, which have the ovipositor approaching the minimum length found in that species. The ovipositor length⁵⁴ is as follows: Wesquage Beach, Rhode Island, 9; Chestnut

⁵⁴ Our ovipositor length measurements are, as elsewhere in the present series of papers, taken from the base of the basal plica to the apex of the ovipositor; this explains the measurements of other authors exceeding ours by about .4 mm. where the length has been taken from the juncture of ovipositor and subgenital plate to apex of ovipositor. We have not used this dimension as it is not sufficiently accurate, the position of the movable subgenital plate affecting it.

Neck, New Jersey, 7.2-8.3; Atlantic City, New Jersey, 7.1-8.8; Ventnor, New Jersey, 7.6-8.7; Ocean City, New Jersey, 8-9.7; Oceanview, Virginia, 9; Wrightsville, North Carolina, 9.1; Tybee Island, Georgia, 8.1-9.8; Virginia Point, Texas, 8.2-9.9 mm.

This species has almost without exception been found in salt marshes, usually in *Spartina patens*, covering the tidal flats. The chiefly macropterous series taken at Virginia Point, Texas, was, however, in high and heavy grasses, where the following field note was made, "A difficult species to capture as individuals are very restless and immediately seek shelter by jumping down low in the bunches of grass where they are very hard to follow." On the coast of New Jersey the species is frequently to be found in great numbers on the salt marshes, both in *Spartina patens* and *Panicularia fluitans*, where large series could be taken with ease. The present insect is now known from Cape Cod, Massachusetts, to Miami, Florida on the Atlantic coast, and on the Gulf coast from Virginia Point, Texas, to Everglade, Florida.

Specimens Examined: Previously correctly recorded, over 30. Here recorded, 253; 123 males, 106 females, 8 immature males and 16 immature females.

Cape Cod, Massachusetts, (Seudder), 8 ♂, 15 ♀, [M. C. Z.].

Saunderstown, Rhode Island, IX, 9, 1913, (H.; in marsh grasses), 1 ♂.

Wesquage Beach, Rhode Island, IX, 10, 1913, (H.; salt marsh), 1 ♀.

New Haven, Connecticut, VIII, 27, 1904, (B. H. Walden), 1 ♂, [Hebard Cln.].

Mullica River flats, Burlington County, New Jersey, VIII, 24, 1914, (H.; occasional in short grasses, *Panicularia fluitans*, on salt marsh), 2 ♂, 1 ♀.

Chestnut Neck, Atlantic County, New Jersey, VIII, 16, 1911, (R. & H.; very common on tidal flats in *Spartina patens*), 15 ♂, 6 ♀.

Atlantic City, New Jersey, IX, 11, 1902, (R.; tidal flats), 3 ♀.

Ventnor, New Jersey, VIII, 5, 1914, (H.; 1 ♀ in marshy depression on barrier beach, and moderately numerous but adults few on tidal flats in *Spartina patens*), 10 ♂, 5 ♀, 9 juv. ♀.

Margate City, New Jersey, VII, 24, 1914, (H.; in great numbers but adults occasional in salt marsh particularly in areas of *Panicularia fluitans*), 9 ♂, 11 ♀, 5 juv. ♂, 4 juv. ♀.

Ocean City, New Jersey, VIII, 14, 1914, (H.; adults in moderate numbers on tidal flats in *Spartina patens*), 4 ♂, 7 ♀, 1 juv. ♂, (1 ♂ macropterous).

Cedar Springs, New Jersey, VIII, 26, 1911, (H.; very scarce in fresh marsh), 1 ♂.

Cape May Court House, New Jersey, VII, 20, 1911, (H.; exceedingly abundant but adults very scarce on tidal flats in *Spartina patens*), 2 ♂, 1 juv. ♂, 2 juv. ♀; VIII, 11, 1911, (H.; adults only, moderately numerous in same locality), 13 ♂, 12 ♀, (1 ♂ macropterous).

Cold Spring, New Jersey, IX, 4, 1907, (B. Long), 1 ♀, [A. N. S. P.].

Cape May, New Jersey, VIII, 7, 1903, (H. L. Viereck), 2 ♂, 1 ♀, [A. N. S. P.].

Oceanview, Virginia, VIII, 8, 1904, (Caudell), 1 ♂, 1 ♀, [U. S. N. M.].

Virginia Beach, Virginia, VII, 2, 1903, (Morse), 1 ♂, 1 ♀, [Morse Cln.], (macropterous).

Wrightsville, North Carolina, IX, 7, 1911, (H.; very scarce in grasses fringing barrier beach tidal lagoon), 1 ♂, 1 ♀.

Tybee Island, Georgia, VIII, 12 and 13, 1903, (Morse), 7 ♂, 5 ♀, [Morse Cln.]; IX, 2, 1911, (H.; common and found far out on tidal flats in low grass), 25 ♂, 18 ♀, 1 juv. ♂, 1 juv. ♀, (1 ♀ macropterous).

Miami, Florida, (Mrs. A. T. Slosson), 1 ♂, [Morse Cln.].

Buras, Louisiana, VII, 25, 1905, (Morse), 8 ♂, 5 ♀, [Morse Cln.], (1 ♂ macropterous).

Virginia Point, Texas, VII, 21, 1912, (H.; common in heavy grasses in salt marsh), 11 ♂, 12 ♀, (9 ♂, 12 ♀ macropterous).

Subgenus **Anarthropus**⁵⁵ new subgenus

The subgenus is known to include two species; of these one, *C. (A.) saltans* (Scudder), is North American and the other, *C. (A.) javanicus* (Redtenbacher),⁵⁶ is Javan.

Type of subgenus.—*Conocephalus saltans* [*Xiphidium saltans*] (Scudder).

Subgeneric Description.—Prosternum unarmed. Subgenital plate of male of the normal type found in the genus; distal margin transverse, bearing minute styles laterad. Ventral margins of cephalic and median femora armed with six well spaced spines. Caudal tibiae with dorsal and ventral pairs of distal spurs absent, armed at the distal extremities with a single pair of well-developed median spurs. Size small to very small for the genus, form rather slender.

Conocephalus saltans (Scudder) (Pl. XVI, fig. 19; XVII, 18; XIX, 7, 8 and 15; XX, 19.)

1862. *Xiphidium brevicauc* Scudder, Can. Nat. and Geol., vii, p. 285. (In part.) [Red River Settlements, Manitoba.]

1872. *Xiphidium saltans* Scudder,⁵⁷ Fin. Rept. U. S. Geol. Surv. Nebr., p. 249. [Banks of the Platte River, Nebraska.]

⁵⁵ From *ἀναρθρος*=weak and *πὸ ὀσ*=foot, in allusion to the missing dorsal and ventral pairs of spurs of the caudal tibiae.

⁵⁶ Abh. k.-k. zool.-botan. Gesell. Wien, xli, p. 526, (1891). The male of this species has the cercus similar to that of *saltans*, but with tooth exceedingly long, evenly and decidedly curved downward.

⁵⁷ Single type here designated: ♀; Platte [River, Nebraska], (Hayden), [M. C. Z.]. Measurements: length of body 12.8, of tegmen 2.7, (caudal femora missing), of ovipositor 13.7 mm.

1891. *Xiphidium modestum* Bruner, Can. Ent., xxiii, p. 56. [Eastern and middle Nebraska.]
1891. *Xiphidium tucniatum* Redtenbacher, Verh. Zool.-botan. Gesell. Wien, xli, pp. 498, 520. [Texas.]

Scudder has properly placed *modestum* and *tucniatum* in the synonymy under the present species.⁵⁸

Typical *saltans* is normally small to very small, and both slender and delicate in structure. A brown phase of coloration is frequently met with, particularly in the southeastern states, but a green color form is also not unusual elsewhere, and in this phase the insect very closely resembles a small example of *C. strictus*.

Pronotum with cephalic margin convex and ventro-cephalic angle weakly indicated to the broadly rounded ventro-caudal angle which is almost 90°, caudal margin weakly convex to the very broad and distinct humeral sinus, convex callosity very broad.

An extremely brachypterous type is normal, and it is consequently rather surprising to find twelve of the two hundred and six specimens recorded strongly macropterous, all of these being from the western portions of the insect's distribution.

The caudal femora have the ventral margins unarmed, the genicular areas not darkened and the genicular lobes unispinose.

The male cerci are of a wholly different type from that of any other North American species, being very slender with a very long slender tooth situated interno-mesad and slightly beyond the middle of the shaft; the distal portion of the cercus tapers evenly to the narrowly rounded apex and is very weakly indented above.

The ovipositor is normally weakly curved and in length measures as follows: Atsion, New Jersey, 10.5-10.7; Fern Hill, Pennsylvania, 12.6-12.9; Asheville, North Carolina, 10.9-13; Thomasville, Georgia, 13.8-15.8; West Point, Nebraska, 9.7-13.8; Sidney, Nebraska, 10.8-13.2; southwestern Nebraska, 15; Dodge City, Kansas, 15.2; Colorado Springs, Colorado, 14.1-15.3; Dallas, Texas, 15.9.

The present insect is one of the latest species to appear in the southeastern United States, the great majority were found on

⁵⁸ Can. Ent., xxx, p. 184, (1898).

the coast of the Carolinas to be immature as late as early September. Among the nearly adult females taken there, the ovipositor ranges from 13.7 to 14.9 mm., which, with our adult series from Thomasville, Georgia, shows that over the lowlands of the southeastern United States the ovipositor averages very long. Males from this region also show the cerci averaging slightly longer and more slender than elsewhere in the distribution of the insect, but, when the variation in almost every large series is noted, the above results, though showing very possibly an incipient geographic differentiation, are by no means sufficient to warrant the recognition of a geographic race. Individuals from Texas and Oklahoma average much the largest of any specimens before us.

The species is widely and generally distributed over the prairies of the middle west, east of this its distribution appears to be more or less discontinuous, the insect preferring sandy or other areas of poor soil such as the serpentine outcrops in Pennsylvania.

The present species is known on the Atlantic coast from the East Plains and Brown's Mills, New Jersey, southward to Yemassee, South Carolina and Thomasville, Georgia, and is probably distributed, except in the northern portion of this region, westward to the base of the Appalachians. The northernmost points of distribution are Toronto, Ontario; the Red River, Aweme and the Souris River, Manitoba, and Moose Jaw, Saskatchewan. In western distribution it has been found along the Yellowstone River as far as Livingston, Montana, and has been taken in Colorado at Fort Collins and Manitou. The most southwestern records are Springer, New Mexico, and Amarillo and Dallas, Texas.

Specimens Examined: Previously recorded, over 30. Here recorded, 208; 73 males, 87 females, 17 in mature males and 31 immature females.

Fern Hill, Chester County, Pennsylvania, IX, 19, 1908, (R. & H.; in grasses on serpentine outcrop), 6 ♂, 6 ♀.

Whitings, New Jersey, IX, 28, 1906, (B. Long), 1 ♂, [A. N. S. P.].

East Plains, Ocean County, New Jersey, VIII, 24, 1914, (H.; in glade of tall grass and also among dwarf pine and oak), 1 ♂, 3 juv. ♀.

Reega, New Jersey, VIII, 2) and 3), 1911, (H.; undergrowth of pine barren) 1 juv. ♂, 2 juv. ♀.

Petersburg, New Jersey, X, 1, 1910, (H. Fox; dry poor land among red cedars), 1 ♀, [A. N. S. P.].

- Somerset Heights, Maryland, V, 24, 1905, (E. S. G. Titus), 1 ♂, [U. S. N. M.].
 Cabin John Run, Maryland, X, 1907, (W. Palmer), 1 ♀, [U. S. N. M.].
 Washington, District of Columbia, VIII, 22 and IX, 6, 1878, 1 ♂, 1 ♀, [U. S. N. M.].
 Fayetteville, North Carolina, IX, 9, 1911, (R. & H.; immature specimens abundant), 7 juv. ♂.
- Wilmington, North Carolina, IX, 9, 1911, (R. & H.; immature individuals common through undergrowth of pine woods, particularly in clumps of scrub oak shoots), 4 ♂, 2 juv. ♂, 3 juv. ♀.
- Winter Park, North Carolina, IX, 7, 1911, (R. & H.; as at Wilmington), 3 ♂, 4 juv. ♀.
- Wrightsville, North Carolina, IX, 7, 1911, (R. & H.; in sandy pine woods), 1 juv. ♀.
- Lake Waccamaw, North Carolina, IX, 8, 1911, (R. & H.), 1 juv. ♂.
- Florence, South Carolina, IX, 6, 1911, (R. & H.; immature specimens common in open grassy glade and in undergrowth of pine woods), 5 juv. ♂, 3 juv. ♀.
- Yemassee, South Carolina, IX, 4, 1911, (R. & H.; in clumps of scrub oak shoots in pine woods), 4 juv. ♂, 2 juv. ♀.
- Atlanta, Georgia, VIII, 2, 1913, (R. & H.), 1 juv. ♂.
- Stone Mountain, Georgia, VIII, 3, 1913, (R. & H.; immature specimens moderately numerous in bunch grass areas in pine woods on mountain), 1 juv. ♂.
- Spring Creek, Decatur County, Georgia, VII, 16 to 29, 1912, (J. C. Bradley), 1 very small juv., [Ga. State Cln.].
- Pine, Indiana, IX, 3, 1906, (J. D. Hood), 1 ♀, [Pa. State Dept. Zool.].
- Chicago, Illinois, IX, 9, 1903, (H.; in waste field), 1 ♀.
- Staples, Minnesota, VII, 21, 1909, (H.; in sandy spot among wild strawberry and other low plants), 7 ♂, 4 ♀, 1 juv. ♀.
- Jefferson County, Iowa, VII, 20 to 24, (J. A. Allen), 3 juv. ♀, [M. C. Z.].
- Dallas County, Iowa, VIII, 20 to 23, (J. A. Allen), 4 ♀, [M. C. Z.].
- Hillsboro, North Dakota, VII, 24, 1891, 1 ♂, [Hebard Cln.].
- Bismarck, North Dakota, VIII, 9, 1889, (Bruner), 2 ♂, 2 ♀, [Hebard Cln.].
- Mandan, North Dakota, VII, 25, 1909, (H.; along streamlet on prairie in grasses), 1 ♂, 1 juv. ♀.
- Dickinson, North Dakota, VII, 25, 1909, (H.), 1 juv. ♀.
- West Point, Nebraska, IX to X, 1882 to 1885, (Bruner), 4 ♂, 21 ♀, [Hebard Cln.], (1 ♂, 2 ♀ macropterous).
- Badger, Nebraska, 1 ♂, [Hebard Cln.].
- Valentine, Nebraska, VIII, 10, 1888, 2 ♂, 1 ♀, [Hebard Cln.]; 1 ♂, 3 ♀, [U. S. N. M.], (1 ♀ macropterous).
- Gordon, Nebraska, (Bruner), 1 ♀, [U. S. N. M.].
- Fort Robinson, Nebraska, VIII, 21, 1888, (Bruner), 2 ♀, [U. S. N. M.].
- Glen, Nebraska, VIII, 6 to 20, 1903, 1 ♂, 3 ♀, [Hebard Cln.], (1 ♀ macropterous).
- Kearney, Nebraska, VII, 27, 1910, (R. & H.; river bottom grassland), 2 ♂, 2 ♀.

North Platte, Nebraska, VII, 28, 1910, (R. & H.; river bottom grassland), 5 ♂, 5 ♀, (1 ♂ macropterous).

Sidney, Nebraska, VII, 30, 1910, (R. & H.; river bottom grassland), 15 ♂, 13 ♀, (1 ♂, 1 ♀ macropterous).

Wichita, Kansas, IX, 7, 1904, (F. B. Isely), 2 ♀, [U. S. N. M.], (1 macropterous).

Dodge City, Kansas, IX, 13, 1909, (H.; in depressions of prairie), 2 ♂, 1 ♀.

Waurika, Oklahoma, X, 14, 1909, (F. C. Bishopp), 1 ♀, [U. S. N. M.].

Summit of Mount Sheridan, Oklahoma, VIII, 24, 1905, (Morse), 1 ♀, [Morse Cln.].

Dallas, Texas, 1 ♂, 3 ♀, [M. C. Z.], (1 ♂, 2 ♀ macropterous).

Clarendon, Texas, VIII, 18, 1905, (Morse), 1 ♂, [Morse Cln.].

Amarillo, Texas, VIII, 19, 1905, (Morse), 3 ♂, [Morse Cln.].

Moose Jaw, Saskatchewan, VIII, 24, 1903, (Caudell), 1 ♀, [U. S. N. M.].

Glendive, Montana, VII, 26, 1909, (H.; river bottom area of grass and sagebrush), 1 juv. ♀.

Forsythe, Montana, VII, 27, 1909, (H.; in cañon and in grassy depressions above bluffs), 2 ♂, 4 ♀.

Billings, Montana, VII, 28, 1909, (R. & H.), 2 ♂.

Livingston, Montana, VII, 29, 1909, (R. & H.; in field of dry grass), 1 ♂.

Julesburg, Colorado, VII, 29, 1910, (R. & H.; river bottom grassland), 2 ♂, 1 ♀.

Manitou, Colorado, VIII, 1889, 1 ♀, [Hebard Cln.].

Springer, New Mexico, IX, 15, 1909, (C. N. Ainslie), 1 ♂, [U. S. N. M.].

EXPLANATION OF PLATES

Plate XV

- Fig. 1.—*Conocephalus allardi* (Caudell). Tray Mountain, Georgia. Subgenital plate of male (*paratype*). ($\times 5\frac{1}{2}$)
- Fig. 2.—*Conocephalus fasciatus fasciatus* (DeGeer). Aweme, Manitoba. Subgenital plate of male. ($\times 5\frac{1}{2}$)
- Fig. 3.—*Conocephalus fasciatus fasciatus* (DeGeer). Aweme, Manitoba. Male. Distal extremity of caudal tibia. ($\times 20$)
- Fig. 4.—*Conocephalus saltans* (Scudder). Fern Hill, Pennsylvania. Male. Distal extremity of caudal tibia. ($\times 20$)
- Fig. 5.—*Conocephalus fasciatus fasciatus* (DeGeer). Aweme, Manitoba. Male. Lateral outline of head. ($\times 10$)
- Fig. 6.—*Conocephalus resaccensis* new species. Piper Plantation, Brownsville, Texas. Male (*type*). Lateral outline. ($\times 3\frac{1}{2}$)
- Fig. 7.—*Conocephalus aigiulus* new species. Wrightsville, North Carolina. Male (*type*). Lateral outline. ($\times 3\frac{1}{2}$) [Figure number omitted on plate.]
- Fig. 8.—*Conocephalus gracillimus* (Morse). Homestead, Florida. Male. Lateral outline of head. ($\times 10$)
- Fig. 9.—*Conocephalus hygrophilus* new species. Milneburg, Louisiana. Male (*allotype*). Lateral outline. ($\times 4$)
- Fig. 10.—*Conocephalus stictomerus* new species. Cedar Springs, New Jersey. Male (*type*). Lateral outline. ($\times 4$)

Plate XVI

Outline of cephalic view of fastigium. ($\times 25$)

- Fig. 1.—*Conocephalus allardi* (Caudell). Tray Mountain, Georgia. Male (*paratype*).
- Fig. 2.—*Conocephalus fasciatus fasciatus* (DeGeer). Aweme, Manitoba. Male.
- Fig. 3.—*Conocephalus fasciatus vicinus* (Morse). Sisson, California. Male.
- Fig. 4.—*Conocephalus spinosus* (Morse). Coronado Beach, California. Female.
- Fig. 5.—*Conocephalus gracillimus* (Morse). Homestead, Florida. Male.
- Fig. 6.—*Conocephalus brevipennis* (Scudder). Tinicum, Pennsylvania. Male.
- Fig. 7.—*Conocephalus resaccensis* new species. Piper Plantation, Brownsville, Texas. Male (*type*).
- Fig. 8.—*Conocephalus nemoralis* (Scudder). Asheville, North Carolina. Male.
- Fig. 9.—*Conocephalus nemoralis* (Scudder). Asheville, North Carolina. Male. Unusually narrow condition.
- Fig. 10.—*Conocephalus occidentalis* (Morse). Sentinel, California. Male.
- Fig. 11.—*Conocephalus strictus* (Scudder). Mt. Airy, Pennsylvania. Male.

- Fig. 12.—*Conocephalus hygrophilus* new species. Milneburg, Louisiana. Male (*allotype*).
- Fig. 13.—*Conocephalus stictomerus* new species. Cedar Springs, New Jersey. Male (*type*).
- Fig. 14.—*Conocephalus aigialus* new species. Wrightsville, North Carolina. Male (*type*).
- Fig. 15.—*Conocephalus nigropleurum* (Bruner). West Point, Nebraska. Male (*type*).
- Fig. 16.—*Conocephalus attenuatus* (Scudder). Vigo County, Indiana. Male.
- Fig. 17.—*Conocephalus nigropleuroides* (Fox). Wrightsville, North Carolina. Male.
- Fig. 18.—*Conocephalus spartinae* (Fox). Chestnut Neck, New Jersey. Male.
- Fig. 19.—*Conocephalus saltans* (Scudder). Fern Hill, Pennsylvania. Male.

Plate XVII

Outline of lateral lobe of pronotum. ($\times 6$)

- Fig. 1.—*Conocephalus allardi* (Caudell). Tray Mountain, Georgia. Male (*paratype*).
- Fig. 2.—*Conocephalus fasciatus fasciatus* (DeGeer). Aweme, Manitoba. Male.
- Fig. 3.—*Conocephalus fasciatus vicinus* (Morse). Sisson, California. Male.
- Fig. 4.—*Conocephalus spinosus* (Morse). Coronado Beach, California. Male.
- Fig. 5.—*Conocephalus gracillimus* (Morse). Homestead, Florida. Male.
- Fig. 6.—*Conocephalus brevipennis* (Scudder). Timicum, Pennsylvania. Male.
- Fig. 7.—*Conocephalus resacensis* new species. Piper Plantation, Brownsville, Texas. Male (*type*).
- Fig. 8.—*Conocephalus nemoralis* (Scudder). Asheville, North Carolina. Male.
- Fig. 9.—*Conocephalus occidentalis* (Morse). Sentinel, California. Male.
- Fig. 10.—*Conocephalus strictus* (Scudder). Mt. Airy, Pennsylvania. Male.
- Fig. 11.—*Conocephalus hygrophilus* new species. Milneburg, Louisiana. Male (*allotype*).
- Fig. 12.—*Conocephalus stictomerus* new species. Cedar Springs, New Jersey. Male (*type*).
- Fig. 13.—*Conocephalus aigialus* new species. Wrightsville, North Carolina. Male (*type*).
- Fig. 14.—*Conocephalus nigropleurum* (Bruner). West Point, Nebraska. Male (*type*).
- Fig. 15.—*Conocephalus attenuatus* (Scudder). Vigo County, Indiana. Male.
- Fig. 16.—*Conocephalus nigropleuroides* (Fox). Wrightsville, North Carolina. Male.
- Fig. 17.—*Conocephalus spartinae* (Fox). Chestnut Neck, New Jersey. Male.
- Fig. 18.—*Conocephalus saltans* (Scudder). Fern Hill, Pennsylvania. Male.

Plate XVIII

Dorsal (shaded) and lateral outlines of male cercus. ($\times 10$)

- Figs. 1 and 2.—*Conocephalus allardi* (Caudell). Tray Mountain, Georgia. (Paratype.)
- Figs. 3 and 4.—*Conocephalus fasciatus fasciatus* (DeGeer). Aweme, Manitoba.
- Figs. 5 and 6.—*Conocephalus fasciatus vicinus* (Morse). Sisson, California.
- Figs. 7 and 8.—*Conocephalus spinosus* (Morse). Coronado Beach, California.
- Figs. 9 and 10.—*Conocephalus gracillimus* (Morse). Homestead, Florida.
- Figs. 11 and 12.—*Conocephalus brevipennis* (Scudder). Tinicum Island, Pennsylvania.
- Figs. 13 and 14.—*Conocephalus resacensis* new species. Piper Plantation, Brownsville, Texas. (Type.)
- Figs. 15 and 16.—*Conocephalus nemoralis* (Scudder). Asheville, North Carolina.
- Figs. 17 and 18.—*Conocephalus occidentalis* (Morse). Sentinel, California.
- Figs. 19 and 20.—*Conocephalus strictus* (Scudder). Mt. Airy, Pennsylvania.
- Figs. 21 and 22.—*Conocephalus hygrophilus* new species. Milneburg, Louisiana. (Allotype.)
- Figs. 23 and 24.—*Conocephalus stictomerus* new species. Cedar Springs, New Jersey. (Type.)
- Figs. 25 and 26.—*Conocephalus aigialus* new species. Wrightsville, North Carolina. (Type.)
- Figs. 27 and 28.—*Conocephalus nigropleurum* (Brumer). West Point, Nebraska. (Type.)
- Figs. 29 and 30.—*Conocephalus attenuatus* (Scudder). Vigo County, Indiana.

Plate XIX

Dorsal (shaded) and lateral outlines of male cercus. ($\times 10$)

- Figs. 1 and 2.—*Conocephalus nigropleuroides* (Fox). Wrightsville, North Carolina.
- Figs. 3 and 4.—*Conocephalus spartinac* (Fox). Chestnut Neck, New Jersey.
- Figs. 5 and 6.—*Conocephalus saltans* (Scudder). Fern Hill, Pennsylvania.
- Figs. 7 and 8.—*Conocephalus saltans* (Scudder). Wilmington, North Carolina.
- Stridulating field of male tegmen. ($\times 7\frac{1}{2}$)
- Fig. 9.—*Conocephalus allardi* (Caudell). Tray Mountain, Georgia. (Paratype.)
- Fig. 10.—*Conocephalus fasciatus fasciatus* (DeGeer). Aweme, Manitoba.
- Fig. 11.—*Conocephalus gracillimus* (Morse). Homestead, Florida.
- Fig. 12.—*Conocephalus nemoralis* (Scudder). Asheville, North Carolina.
- Fig. 13.—*Conocephalus occidentalis* (Morse). Sentinel, California.
- Fig. 14.—*Conocephalus nigropleurum* (Brumer). West Point, Nebraska. (Type.)
- Fig. 15.—*Conocephalus saltans* (Scudder). Fern Hill, Pennsylvania.

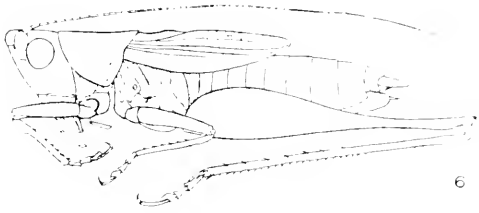
Plate XX

Outline of ovipositor. ($\times 2$)

- Fig. 1.—*Conocephalus allardi* (Caudell). Tray Mountain, Georgia. (*Paratype.*)
- Fig. 2.—*Conocephalus fasciatus fasciatus* (DeGeer). Aweme, Manitoba.
- Fig. 3.—*Conocephalus fasciatus vicinus* (Morse). Sisson, California.
- Fig. 4.—*Conocephalus spinosus* (Morse). Coronado Beach, California.
- Fig. 5.—*Conocephalus gracillimus* (Morse). Homestead, Florida.
- Fig. 6.—*Conocephalus brevipennis* (Scudder). Timicum, Pennsylvania.
- Fig. 7.—*Conocephalus brevipennis* (Scudder). Asheville, North Carolina.
- Fig. 8.—*Conocephalus resaccensis* new species. Piper Plantation, Brownsville, Texas. (*Allotype.*)
- Fig. 9.—*Conocephalus nemoralis* (Scudder). Asheville, North Carolina.
- Fig. 10.—*Conocephalus occidentalis* (Morse). Sisson, California.
- Fig. 11.—*Conocephalus strictus* (Scudder). Raleigh, North Carolina.
- Fig. 12.—*Conocephalus hygrophilus* new species. Virginia Point, Texas. (*Type.*)
- Fig. 13.—*Conocephalus strictomerus* new species. Cedar Springs, New Jersey. (*Allotype.*)
- Fig. 14.—*Conocephalus aigialus* new species. Wrightsville, North Carolina. (*Allotype.*)
- Fig. 15.—*Conocephalus nigropleurum* (Bruner). Lincoln, Nebraska. (*Paratype.*)
- Fig. 16.—*Conocephalus attenuatus* (Scudder). West Point, Nebraska.
- Fig. 17.—*Conocephalus nigropleuroides* (Fox). Wrightsville, North Carolina.
- Fig. 18.—*Conocephalus spartinae* (Fox). Chestnut Neck, New Jersey.
- Fig. 19.—*Conocephalus saltans* (Scudder). Fern Hill, Pennsylvania.

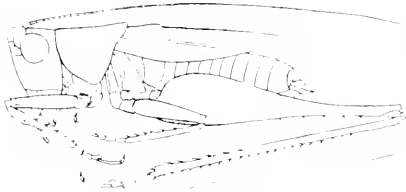


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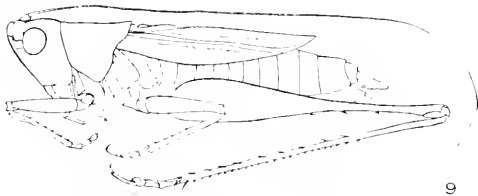


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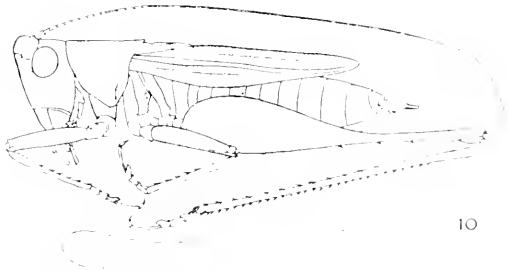
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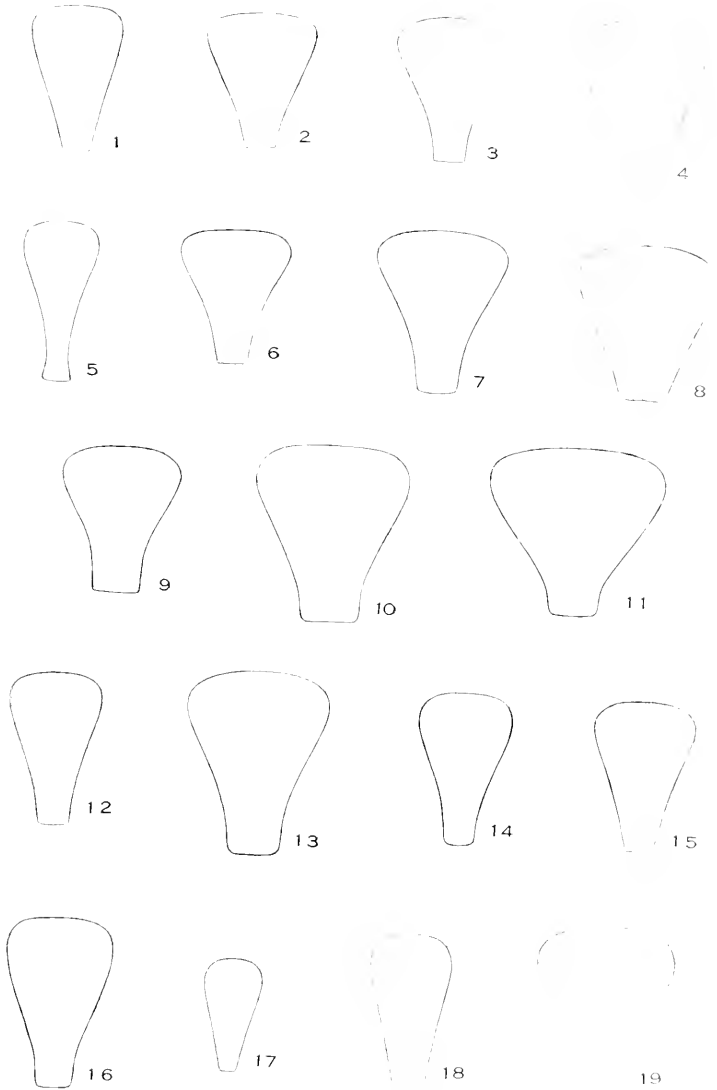
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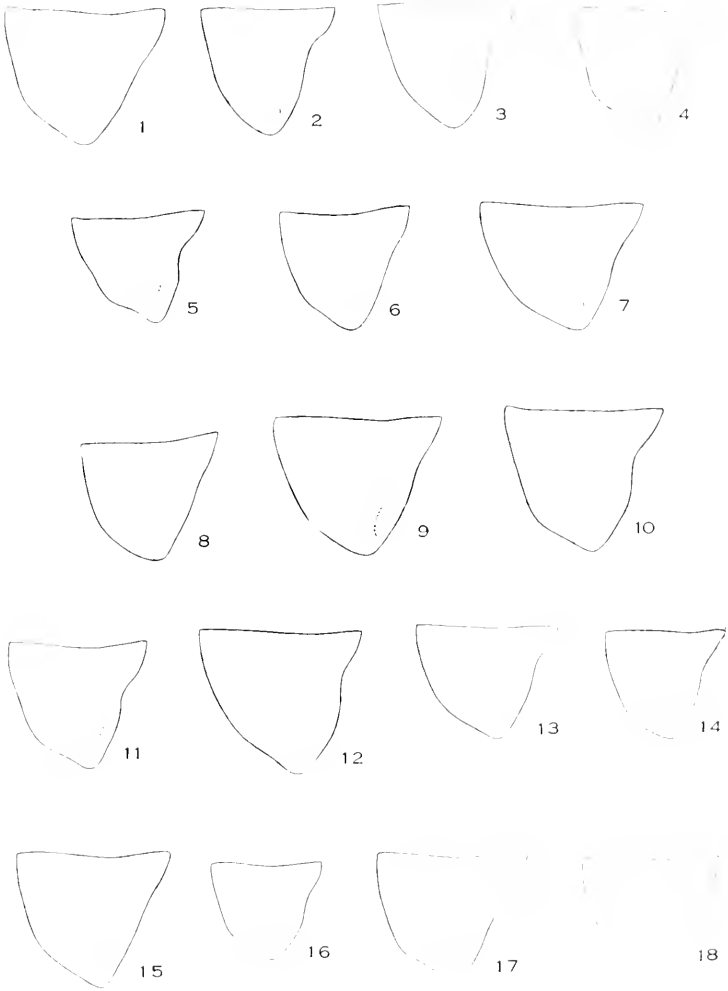


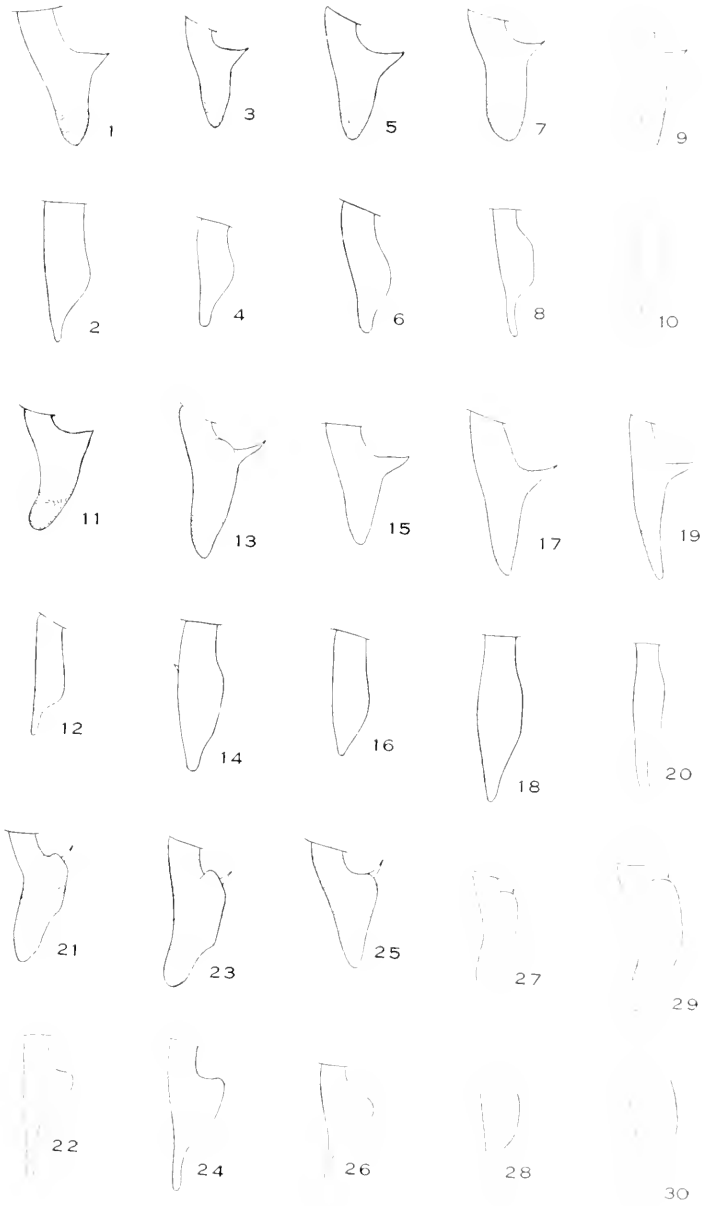
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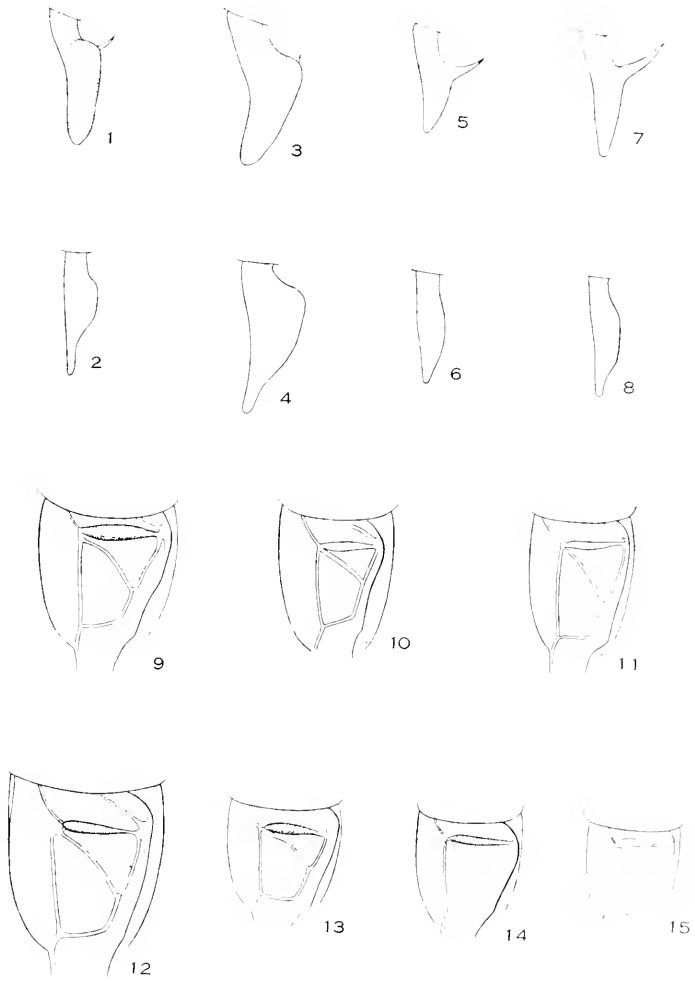


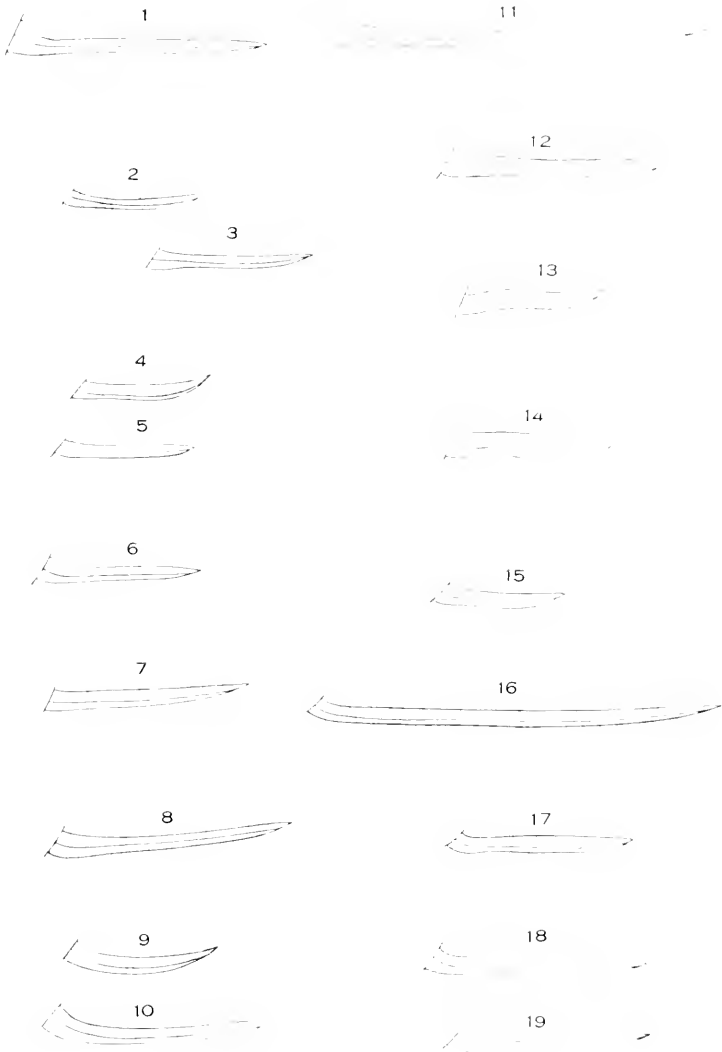
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STUDIES IN AMERICAN TETTIGONIIDAE
(ORTHOPTERA)

VI.

BY JAMES A. G. REHN AND MORGAN HEBARD

A SYNOPSIS OF THE SPECIES OF THE GENUS
CONOCEPHALUS FOUND IN AMERICA SOUTH OF
THE SOUTHERN BORDER OF THE UNITED
STATES¹

In a recent paper,² the authors have studied the species of the genus *Conocephalus* found in North America north of Mexico; in that paper the generic references, genotype, description and discussion of the history of the genus and its then recognized subgenera have been fully treated. We were obliged at that time to examine our series of the genus from the other portions of America, and, finding that we had material of the great majority of the species before us and the opportunity to correct many misconceptions, to give many important but hitherto wholly neglected or hurriedly considered characters, as well as to establish a number of very confusing names as synonyms, we determined to study all of the American forms of the genus. The present paper is by no means as complete as the first portion of the study, for in much of the territory considered there has been little or no collecting accomplished and the series before us, though far larger than any others previously studied, contain few specimens of some species and none of several of which the types are inaccessible to us and the original descriptions of the same vague and uncertain. Our efforts are here concentrated in defining the species known to us as accurately as we are able, with the hope that by so doing many of the difficulties and misconceptions of the past may be eradicated from future study of the American forms of the genus.

¹ Published with the aid of the Orthoptera Fund.

² Trans. Am. Ent. Soc., xli, pp. 155 to 224, (1915).

The following key includes, in addition to the subgenera recognized by us in the first paper, others here created. Unquestionably numerous other subgenera exist and will be described when careful study of the species of the world is made.

Key to the Subgenera of the Genus Conocephalus

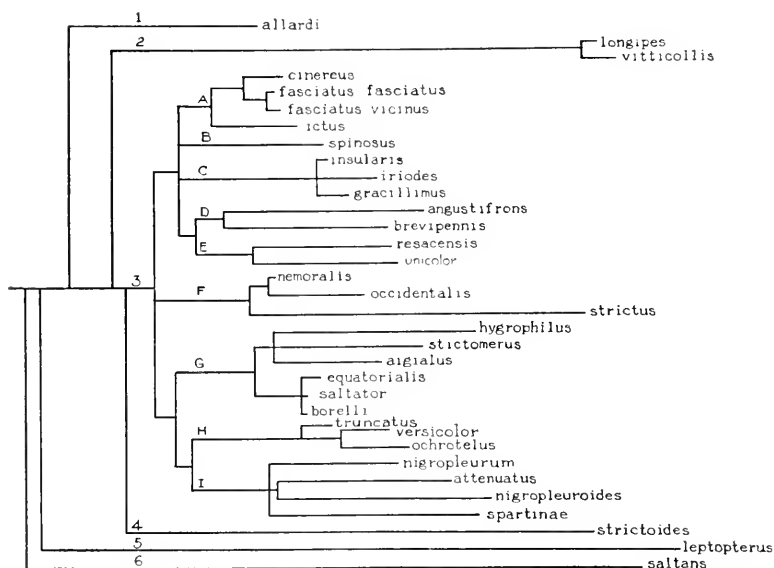
- A. Prosternum bispinose.
- B. Caudal tibiae armed at distal extremity with three pairs of spurs.
- C. Ventral margins of cephalic and median tibiae armed with five to seven (normally six) well spaced spines.
- D. Male subgenital plate produced in long sharp spikes.
- E. Productions situated meso-distad, intervening space strongly obtuse-angulate emarginate; styles absent.
- Dicellura** Rehn and Hebard
- EE. Productions situated disto-laterad, intervening space roundly emarginate; awl-like styles present, situated on ventral surfaces of lateral productions.
- Opeastylus** new subgenus
- DD. Male subgenital plate with distal margin more or less decidedly truncate with no decided emargination or production; small, slender, filiform styles present disto-laterad.
- Xiphidion** Serville
- CC. Ventral margins of cephalic and median tibiae armed with nine to ten closely set spines.
- Palotta** F. Walker
- BB. Caudal tibiae armed at distal extremity with five spurs (interno-dorsal spur missing). Ventral margins of cephalic and median tibiae armed with six well spaced spines. Male subgenital plate as in *Xiphidion*.
- Perissacanthus** new subgenus
- BBB. Caudal tibiae armed at distal extremity with a single pair of spurs (dorsal and ventral pairs absent). Ventral margins of cephalic and median tibiae armed with seven to eight well spaced spines.
- Aphauropus** new subgenus
- AA. Prosternum unarmed. (Ventral margins of cephalic and median tibiae armed with five to seven well spaced spines.)
- B. Caudal tibiae armed at distal extremity with three pairs of spurs.
- Conocephalus** Thunberg
- BB. Caudal tibiae armed at distal extremity with a single pair of spurs (dorsal and ventral pairs absent). (Male subgenital plate as in *Xiphidion*.)
- Anarthropus** Rehn and Hebard

As yet, *Dicellura* is known only from the southern Appalachian region of the eastern United States, *Opeastylus* is widely distributed in temperate and subtropical South America and the only subgenus found in the former region, *Xiphidion* is the dominant subgenus from subtropical South America northward

and is circumorbital in distribution, *Palotta* and *Conocephalus* are known from the Old World only, *Perissacanthus* has been found only in Paraguay, *Aphauropus* is known only from Tepic, Mexico, while *Anarthropus* is known from a species widely distributed in the United States and southern Canada, and from another species from Java.

The genus is probably found everywhere over the region under consideration south as far as the extremity of the mainland of South America. Lack of material from northern Mexico is much to be regretted. The following forms, treated fully in the authors' first paper on the genus, are unquestionably present in that region, *Conocephalus fasciatus fasciatus*, *fasciatus vicinus*, *spinus*, *resacensis* and *strictus*; for all of these have been taken in the United States on the Mexican border, and the first and third of these forms are here recorded from farther southward. In addition *Conocephalus hygrophilus* and *spartinae* will very possibly be found to occur in the salt marsh vegetation along the Gulf Coast, south of the Rio Grande, in Mexico. In desert regions the genus is, as in the United States, doubtless confined to mountains, rivers, streams, lakes and irrigated tracts where a constant supply of water is to be found. The low watersheds of the Orinoco, Amazon and La Plata systems do not act as controls in the distribution of the species, but the main chain of the Andes appears to afford an absolute barrier. A single species, widely distributed in North America, alone is known from Bermuda. The Greater Antilles have, apparently, but two species, the least abundant, *C. insularis*, peculiar to these islands, the other, *C. cinereus*, in addition widely distributed from central Mexico to the headwaters of the Amazon. The Lesser Antilles, on the other hand, appear to have but one species, *C. saltator*, which is the most widely distributed and, apparently, the most abundant species from Costa Rica southward throughout South America to Paraguay and Eastern Peru.

The following table illustrates the relationship of the American forms of the genus known to us; showing, in addition to the forms here studied, the position of the forms restricted to North America which have been treated in the previous paper.



The numbers given above designate the six subgenera known from America, the letters indicate the American groups of the very large subgenus *Xiphidion*. Of these, A, B, C and D form more or less of a unit, while E contains two species which are nearly intermediate in position between this and the unit formed by the groups, G, H and I, all three of which latter groups are, however, somewhat more widely separated one from the other than are the first four groups. Group F is distinctive. Comparing the male cerci of the American species of the other subgenera with those of the species constituting groups of the subgenus *Xiphidion*, we find that *C. (Dicellura) allardi* agrees best with group A; the two species *C. (Opeastylus) longipes* and *vitticollis* are distinctive; *C. (Perissacanthus) strictoides* agrees best with group I; *C. (Aphauropus) leptopterus*, being known only from the female sex, can not in this respect be definitely associated, though the general structure of the insect suggests that the male cerci may agree best with group F; while *C. (Anarthropus) saltans* is distinctive.

Material Examined.—We have studied the material of the genus from North America north of Mexico, nearly 3800 specimens, and, in addition to a series of nearly 100 specimens pre-

viously correctly recorded, we have examined and recorded in the present paper 804 specimens, of which 571 are in the Hebard Collection and that of the Academy of Natural Sciences of Philadelphia. The combined figures form a total of about 4700 American specimens of *Conocephalus*.

We desire to express our deep obligation to Mr. A. N. Caudell of the United States National Museum, Dr. Samuel Henshaw of the Museum of Comparative Zoology and Dr. F. E. Lutz of the American Museum of Natural History, for the great privilege of examining and studying all of the material of the genus contained in the collections of those institutions. With the exception of McNeill's *exitiosum* and Bruners's two recently described species we have had before us all of the types of the valid forms of the genus located in America.

*Key to Males of the Species of the Genus Conocephalus found in America north to the southern border of the United States.*³

(No species of the genus with prosternum unarmed is known from the region under consideration.)

A. Caudal tibiae armed distad with three pairs of spurs.

B. Subgenital plate very strongly and sharply produced latero-distad in sharp straight spikes which are weakly divergent, on the ventral surfaces of which productions are situated awl-like styles, distal margin of plate roundly emarginate mesad.
(Subgenus **Opeastylus**)

C. Form moderately slender. Fastigium of vertex little over one-half width of proximal antennal joint. Convex callosity of lateral lobes very broad. Swollen shelf above cereal tooth less extensive. Caudal femora with ventro-external margins armed normally with two and three spines.

longipes (Redtenbacher)

CC. Form moderately robust. Fastigium of vertex somewhat more than two-thirds width of proximal antennal joint. Convex callosity of lateral lobes exceedingly broad. Swollen shelf above cereal tooth more extensive. Caudal femora with ventral margins unarmed.

vitticollis (Blanchard)

BB. Subgenital plate not produced disto-laterad, disto-lateral styles small and filiform, distal margin of plate nearly or exactly transverse.

(Subgenus **Xiphidion**)

C. Cerei armed with a heavy mesal (vertical) tooth so that its base is entirely visible from above, this tooth situated mesad.

D. Cerei with mesal portion not contrastingly swollen.

³ See p. 235 for a discussion of the species not represented in our material.

E. Cerci with distal portion not greatly produced, weakly to very decidedly depressed, and with apex broad and rounded.

F. Tympanum of tegmina not unusually elongate. Convex callosity of lateral lobes not very broad. Vertex moderately produced.

G. Cerci with distal portion moderately produced, the depression of the same being general and not more decided on the inner side.

H. Fastigium of vertex about two-thirds⁴ width of basal antennal joint. Ventral margins of caudal femora normally unarmed (spines when present never more than one to three).

I. Eyes moderately large. Convex callosity of lateral lobes very narrow. Abdomen immaculate, with distal half, including cerci, uniform and striking yellow. Distal portion of cerci decidedly depressed and narrowing more sharply to the more narrowly (but still rather broadly) rounded apex. (Form moderately slender.) **cinereus** (Thunberg)

H. Eyes decidedly small. Convex callosity of lateral lobes moderately but not decidedly broad. Dorsum of abdomen trifasciate, with median line broad. Distal portion of cerci weakly depressed, scarcely narrowing to the very broadly rounded apex.

J. Form slender. Abdominal fasciae moderately distinct, colors brilliant. **fasciatus fasciatus** (DeGeer)

JJ. Form moderately slender. Abdominal fasciae very distinct, colors brilliant (particularly so in life).

fasciatus vicinus (Morse)

III. Fastigium of vertex as wide as proximal antennal joint.⁵ Ventro-external margins of caudal femora normally armed.

I. Form moderately robust. Convex callosity of lateral lobes very narrow. Abdomen immaculate, with distal portion, including cerci, clear pale yellow. Cerci heavy, elongate, with distal portion decidedly depressed, scarcely narrowing to the very broadly rounded apex. Ventro-external margins of caudal femora bearing normally three and four spines. **spinosus** (Morse)

⁴ Though the above is the normal condition in *C. cinereus*, this usually very constant character varies occasionally in that species from slightly less than two-thirds of to fully the width of the proximal antennal joint, as discussed in the specific treatment.

⁵ This usually very constant character shows a decided variability in *C. icetus*; one series from the state of Vera Cruz, Mexico, including specimens in which the fastigium of the vertex is but two-thirds as wide as the proximal antennal joint. In consequence this variation is important in determining material from that region and must not be overlooked.

II. Form very robust and truncate. Convex callosity of lateral lobes moderately broad. Distal portion of abdomen, including cerci, tawny. Cerci similar to those of *cinereus*. Ventro-external margins of caudal femora bearing normally two and three spines.⁶ **ictus** (Seudder)

GG. Cerci with distal portion more strongly produced and distinctly curved outward, the depression of the same being more decided on the inner side. (Form very robust. Fastigium of vertex strongly ascending, greatest width slightly less than one-half that of proximal antennal joint. Eyes large and protruding. Convex callosity of lateral lobes exceedingly narrow. Abdomen, including cerci, mahogany red. Ventro-external margins of caudal femora bearing normally three and four spines.⁷

angustifrons (Redtenbacher)

FF. Tympanum of tegmina unusually elongate. Convex callosity of lateral lobes very broad. Vertex distinctly produced.⁸

G. Coloration not unusually brilliant; dorsum of abdomen narrowly, but usually strikingly, trifasciate. Cerci normally green, of similar type to those of *fasciatus* but distinctly more elongate and attenuate, with distal portion very strongly depressed (as in *C. gracillimus*). Ventro-external margins of caudal femora sometimes unarmed, sometimes supplied with one to three spines. **insularis** (Morse)

GG. Coloration unusually brilliant; wings iridescent; dorsum of abdomen broadly, but not strikingly, trifasciate. Cerci burnt lake, slightly longer than in *fasciatus*, distal portion weakly but distinctly curved outward, with broadly rounded apex briefly but strongly depressed. Ventral margins of caudal femora unarmed. **iriodes** new species

EE. Cerci with distal portion very greatly produced, very elongate and attenuate, very weakly depressed distad, with apex strongly acuminate. (Fastigium of vertex about one and one-half times width of proximal antennal joint. Convex callosity of lateral lobes very broad. Dorsum of abdomen normally infuscated, cerci dark. Ventral margins of caudal femora unarmed.) **strictus** (Seudder)

⁶ A number of specimens from the state of Vera Cruz, Mexico, have the ventral margins of the caudal femora unarmed, but are otherwise typical of smaller individuals of the species, as are the specimens showing the variation remarked in the preceding foot-note.

⁷ In this species the armament of the ventral margins of the cephalic and median tibiae is decidedly unusual, in every specimen before us at least one of these margins bears seven, instead of six, spines.

⁸ As in *C. gracillimus*, which has the vertex even more distinctly produced, the occiput ascends evenly toward the vertex, the vertex ascending slightly more decidedly but very nearly in the same plane.

DD. Cerci with mesal portion contrastingly swollen.

E. Form moderately slender. Vertex not strongly but distinctly ascending, fastigium of vertex two-thirds width of proximal antennal joint. Eyes moderately large. Convex callosity of lateral lobes moderately broad. Abdomen immaculate, with distal portion, including cerci, pale yellow brown. Ventro-external margins of caudal femora armed with four to six spines. **unicolor** Bruner

EE. Form very slender, distinctly attenuate. Vertex not ascending, fastigium of vertex slightly wider than proximal antennal joint. Eyes normal. Convex callosity of lateral lobes very broad. Abdomen immaculate with distal portion, including cerci, pale yellowish. Ventral margins of caudal femora unarmed.

resacensis Rehn and Hebard

CC. Cerci armed with a more delicate ventral (vertical) tooth so that its base and often the greater portion is concealed from above, mesal portion of cercus very contrastingly swollen, tooth situated at proximal base of this swelling, (distal portion of cercus greatly depressed).

D. Coloration not unusually brilliant or distinctive.

E. Fastigium of vertex slightly less to slightly more than one-half width of proximal antennal joint. Convex callosity of lateral lobes moderately broad. Ventro-internal margins of caudal femora armed. Discoidal and anal fields of tegmina, and adjacent portion of wings when at rest, distinctly darkened. (Swollen mesal portion of cercus with section above tooth produced overhanging and rather sharply rounded, distal portion elongate, very strongly depressed, particularly on inner side. Form moderately slender. Eyes moderately large. Ventro-external margins of caudal femora armed normally with four and four spines. Wings iridescent.) **equatorialis** (Giglio-Tos)

EE. Fastigium of vertex broader. Convex callosity of lateral lobes very narrow. Ventro-internal margins of caudal femora unarmed. Discoidal and anal fields of tegmina, and adjacent portion of wings, when at rest, not darkened.

F. Cerci of same type as in *equatorialis* but decidedly elongate, varying in production and outward curvature of distal portion to very elongate. Form moderately slender to moderately robust. Eyes moderately large. Fastigium of vertex slightly less than, to fully two-thirds as broad as proximal antennal joint. Ventro-external margins of caudal femora armed normally with two and three spines.⁹ (Wings somewhat iridescent.) **saltator** (Saussure)

⁹ In five specimens from the large series from Trinidad and Venezuela, these margins are unarmed; in four specimens from considerable series from Dominica and Trinidad, the cephalic and median tibiae have the ventro-cephalic margins armed with seven, instead of the normal six, spines. The present species is the most abundant and the most variable over the greater portion of South America, and material must be studied from every aspect if accurate results are to be obtained.

FF. Cerci?¹⁰ Form decidedly robust. Eyes distinctly larger. Fastigium of vertex slightly less than two-thirds as broad as proximal antennal joint.¹¹ Ventro-external margins of caudal femora armed with four to five spines.

borelli (Giglio-Tos)

DD. Coloration unusually brilliant and distinctive. (Form moderately robust. Convex callosity of lateral lobes very narrow. Cereal tooth directed strongly meso-proximad.)

E. Caudal femora with ventral margins unarmed. Abdomen not unusually colored. (Fastigium of vertex one-half width of proximal antennal joint. Apex of tegmina broadly rounded, truncate. Distal portion of cercus shorter than in *versicolor*, lateral margins converging to the acute apex.)

truncatus (Redtenbacher)

EE. Caudal femora with ventro-external margins armed. Abdomen conspicuously and remarkably colored.

F. Fastigium of vertex one-half width of proximal antennal joint. Apex of tegmina (in brachypterous condition as well) sharply rounded. Distal portion of cercus elongate with lateral margins weakly irregular but converging very gently and evenly to the rather sharply rounded apex. Caudal femora with ventro-external margins armed with three to five spines.

versicolor (Redtenbacher)

FF. Fastigium of vertex narrow but about two-thirds width of proximal antennal joint. Apex of tegmina broadly rounded, truncate. Mesal swollen portion of cercus more ample and decidedly more elongate than in *versicolor*, distal portion broad and elongate, with lateral margins arcuato-convergent distad to the very sharply rounded apex, thus forming a very narrow gothic arch. Ventro-external margins of caudal femora armed with five to eight spines.

ochrotelus new species

AA. Caudal tibiae armed at distal extremity with five spurs, the interno-dorsal spur being absent. (Cephalic and median tibiae armed with six well spaced spines. Male subgenital plate as in *Xiphidion*.)

(Subgenus **Perissacanthus**)

(Form very slender. Vertex strongly produced, not ascending, fastigium of vertex slightly more than one-half width of proximal antennal joint. Eyes rather small for South American species. Convex callosity of lateral lobes rather narrow. Apex of tegmina broadly rounded, truncate. Cerci suggesting type found in group I of *Xiphidion*, but distinctive in the characters given in the specific discussion. Ventral margins of caudal femora unarmed.)

strictoides (Caudell)

¹⁰ Though we have no males of this species before us, we are convinced, from the original description and the evident close relationship shown by the females, that males of the species have cerci agreeing at least in general form with those of *C. saltator*.

¹¹ Distinctly narrower than in material of *C. saltator* where the ranges of the two coincide.

AAA. Caudal tibiae armed at distal extremity with one pair of spurs, the dorsal and ventral pairs of spurs being absent. (Agreeing with *Anarthropus* in this respect, but differing in the armed prosternum and armament of the cephalic and median tibiae, the ventral margins of which are armed with seven to eight well spaced spines.)

(Subgenus **Aphauropus**)

(Form robust. Vertex not decidedly produced, not ascending, fastigium of vertex two-thirds width of proximal antennal joint. Convex callosity of lateral lobes exceedingly broad. Tegmina greatly aborted and wholly concealed by pronotum, wings absent. Ventral margins of caudal femora unarmed.)

leptopterus new species

In the above key it must be noted that only the usually most useful and also the most distinctive characters are given; in numerous cases material can only be determined properly through careful consideration of all the specific details which are given, as far as we are able, in the specific treatment. The figures are of great importance in showing frequently complicated differences very difficult to describe clearly, and also degrees of difference, while for females only characters common to both sexes will be found in the above key, the characters peculiar to that sex being discussed in the specific treatment, shown by figures, and tabulated in part on pages 237 to 239.

Many species have individual characters of decided value, which in a key would be cumbersome and confusing. Some of these are: the depth of the fastigium of the vertex and the form of its lateral margins, the shape of the lateral lobes of the pronotum and the humeral sinus, the minor specific differences of the male tegminal tympanum, the spination of the genicular lobes of the caudal femora and the coloration of the genicular areas of the same, the general though obscure pattern of coloration in species not strikingly marked and the length of the styles of the subgenital plate.

Extremely slight variations are found which cannot be wholly overlooked, but which can hardly be considered in the treatment of each species without giving them undue emphasis. Such is the fact, only determinable after examination of large series, that in species having both macropterous and brachypterous forms, the latter type is almost always accompanied by a slight pronotal change, the dorsum of the pronotum being usually slightly less produced caudad, with a proportionate reduction in the depth of the humeral sinus and the caudal margin of the lateral lobes becoming slightly less sinuous than in the macropterous condition.

We have observed that the antennal length is decidedly greater in some species than in others, but accurate measurements of the same are very difficult and these delicate organs are found to be incomplete in so many cases that we have deemed it best to omit discussions of the same.

Efforts to include all the known species in the keys of Redtenbacher,¹² Saussure and Pictet,¹³ Karny¹⁴ and Bruner¹⁵ without having material of many of the species for examination, combined with the employment of such usually worthless characters as tegminal and ovipositor length—given with scarcely any regard to the extremes of variation and in complete disregard of the probability of macropterism and brachypterism appearing in the same species—has made these keys virtually worthless and in many cases misleading in the extreme.

The following described species do not appear to be included in the material before us. In future studies with the present paper they must be carefully considered, but at present we feel only justified in giving the following brief remarks resulting from study of the various original descriptions and in tabulating these species from the same source as far as possible on pages 238 and 239.

caizanum

1897. [*Xiphidium*] *caizanum* Giglio-Tos, Boll. Mus. Zool. Anat. comp. Univ. Torino, xii, no. 302, p. 42. [1 ♂: Caiza, Ecuador.]

The form of the cerci and subgenital plate is apparently different from any other known American species. The species very possibly belongs to an undescribed subgenus, apparently between the subgenera *Dicellura* and *Xiphidion*.

exitiosum

1901. *Xiphidium exitiosum* McNeill, Proc. Wash. Acad. Sci., iii, p. 501, fig. 42. [2 ♂, 3 ♀, 3 juv.: Indefatigable Island, Galapagos Islands.]

This species is so poorly described and the rough sketchy outline figure of the female so unsatisfactory, that we can but state that the species may be related to *C. cinereus*.

¹² Verh. k.-k. zool.-bot. Gesell. Wien, xli, pp. 495-499, (1894).

¹³ Biol. Cent.-Amer., Orth. i, pp. 396-397, (1898).

¹⁴ Abh. k.-k. zool.-bot. Gesell. Wien, xli, pp. 85-94, (1907).

¹⁵ Ann. Carneg. Mus., ix, pp. 372-374, (June 1815).

resinum

1898. *Xiphidium resinum* Saussure and Pietet, Biol. Cent.-Amer., Orth., i, p. 398, pl. xix, figs. 26, 27. [1 ♂: Orizaba, Mexico.]

The brief and very unsatisfactory description, accompanied by good figures of the vertex, affords insufficient evidence for the proper placing of the species. It may be very near *C. angustifrons*, or instead allied to *C. gracillimus*. The characters given agree with *angustifrons* excepting that the vertex is more produced, the specimen is strongly macropterous and the caudal femora have, we are led to suppose, the ventral margins unarmed. The vertex is decidedly too narrow for *gracillimus*. The species with which it is compared, *unispina*, is a member of the genus *Orchelimum*.

doryphorum

1907. *Xiphidium doryphorum* Karny, Abh. k.-k. zool.-bot. Gesell. Wien, iv, p. 96. [1 ♀: Uruguay.]

This diminutive species may be very closely allied to *C. stricoides*. The strongly oblique caudal margin of the lateral lobes of the pronotum and different measurements indicate that it is distinct. Length: body 9, pronotum 3.3, tegmen 0.3, caudal femur 9.7, ovipositor 11 mm.

aberrans

1901. *Xiphidium aberrans* Redtenbacher, Verh. k.-k. zool.-bot. Gesell. Wien, xli, p. 516. [More than one ♀: Rio Grande do Sul, Brazil.]

The nine to ten spines of the ventral margins of the cephalic tibiae would apparently place this species in a different subgenus from any of those known from America. The fastigium of the vertex is narrow; the caudal margin of the lateral lobes is distinctly sinuate, the convex callosity oval and distinct.

Of the species previously referred to this genus or its synonyms from North America, *Xiphidium unispina* is known to be a member of the genus *Orchelimum*.¹⁶ We must also bear in mind that the genus *Conocephalus* of authors has applied until recently, not to the present forms, but to those American species which must now be placed in the genera *Neoconocephalus* and *Homocoryphus*.

¹⁶ Vide Rehn and Hebard, Trans. Amer. Entom. Soc., xli, p. 81, (1915).

We give below in tabular form the extremes found in species in tegminal and ovipositor length (in millimeters), and have also stated the general form of the ovipositor and the results obtained from counting the spines of the ventro-external margins of the caudal femora. The normal counts for these spines give the number for each limb individually, the extremes are based on single limbs.

		Tegmina		Ovipositor	Spines of ventro-external margins of caudal femora
		Macropterous	Brachypterous		
<i>longipes</i>	♂	15.3-20.9	.....	straight.	normally 2 and 3.
	♀	16.9-23.3	.....	7.4-9.8 ¹⁷	extremes 1 to 5.
<i>vitticollis</i>	♂	12.8-19.8	.....	straight.	none.
	♀	14.6-20.7	.....	7.6-10.2	
<i>cineurus</i>	♂	20.9 ranging to 8 ¹⁸		straight.	normally 0.
	♀	19.8 ranging to 9		7-11.2	14% 1 to 2
<i>f. fasciatus</i>	♂	11.7-19.3	.....	straight.	normally 0.
	♀	10-21.1	.....	7-9.9	13% 1 to 3.
<i>f. vicinus</i>	♂	16.4-18.7	9.9-13.1 ¹⁹	straight.	normally 0.
	♀	15.6-18.5	10.6-13.9	7.5-13	4% 1 to 2.
<i>ictus</i>	♂	15.2-19.9	6-9.3 ²⁰	straight.	normally 2 and 3.
	♀	19.1	4.8-10.1	9.3-13.9	14% 0.
<i>spinosus</i>	♂	14.3-21.1	.....	very weakly	normally 3 and 4.
	♀	16.2-22.8	.....	curved, broader, 7-10.1	extremes 2 to 6.
<i>insularis</i>	♂	18.6 ranging to 2 ¹ 9.1		straight.	normally 0 and 4.
	♀	19.3 ranging to 11.3		8.9-10.1	41% 0. extremes 0 to 3.

¹⁷ Our measurements are taken from the base of the basal plica to the apex of the ovipositor. Redtenbacher gives 10.2 mm. for the maximum ovipositor length of this species, measuring probably from the juncture of the subgenital plate and ovipositor; this measurement is not constant, due to the mobility of the subgenital plate, and would frequently exceed the dimension given by us by about .4 mm.

¹⁸ In this species the intergradation between the extremes of the macropterous and semi-macropterous condition is gradual, and numerous intermediate specimens are before us.

¹⁹ No truly brachypterous form occurs in this geographic race, the material treated in this column being more accurately termed semi-macropterous.

²⁰ Tegminal length of one intermediate male 11.4 mm., and of one intermediate female 13.9 mm. This is the only American species known to us in which intermediates are found, though rarely, between a strongly macropterous and a strongly brachypterous condition.

²¹ As in *cineurus*, the intergradation between the extremes of the macropterous and semi-macropterous condition is gradual.

		Tegmina		Ovipositor	Spines of ventro-external margins of caudal femora
		Macropterous	Brachypterous		
<i>irioides</i>	♂	15.2-16.4	.....	nearly straight.	none.
	♀	16.2-19.3	.....	7.3-7.9	
<i>angustifrons</i>	♂	.....	8.2-9.4	nearly straight.	normally 3 and 4.
	♀	15.9	6.5-8.7	8-10	extremes 1 to 7.
<i>resacensis</i>*	♂	.....	7.1-8.8	straight.	none.
	♀	.....	5.6-6	15.2-15.6	
<i>unicolor</i> *	♂	17	.....	nearly straight.	normally 4 and 5.
	♀	18.4-18.9	.....	14.7-16.4	extremes 4 to 6.
<i>strictus</i>	♂	15.7-17.8	5.1-7.3	nearly straight.	none.
	♀	15.4-22	2.8-5.8	17.7-32.3	
<i>equatorialis</i>	♂	17.3-19.6	12.2-14.6	nearly straight.	normally 4 and 4.
	♀	18.1-19.5	11 ²² -15 ²²	7.2-9.9 ²³	extremes 1 to 6.
<i>saltator</i>	♂	15-20.4	5.8-8.8	weakly curved	normally 2 and 3.
	♀	16.7-21.3	3.3-6.1	to nearly straight.	-2% 0. extremes 0 to 6.
<i>borelli</i>*	♂	.....	4 ²²	distinctly	normally 4 and 5.
	♀	.....	2.5 ²² -3.9	curved.	extremes 4 to 5.
<i>truncatus</i>	♂	.....	5.2-5.8	weakly but dis-	none.
	♀	.....	2.6-2.9	tinctly curved.	
<i>versicolor</i> *	♂	19 ²²	5.5 ²⁵ -7.6	nearly straight.	normally 4 and 4.
	♀	20.3-22 ²⁴	6 ²⁵ -7 ²⁵	9 ²⁵ -13	extremes 3 to 5.
<i>ochrotelus</i>**	♂	.....	4.9 and 5.2 ²⁶		extremes 5 to 8.
	♀	?	
<i>strictoides</i>*	♂	.....	7.6-7.9	nearly straight.	none.
	♀	.....	3 ²² -3.5 ²²	21.1-24 ²²	
<i>leptopterus</i>**	♂	.....	.....	nearly straight.	none.
	♀	.....	concealed.	30.1	
INCERTAE SEDIS ²⁷ :					
<i>caizanum</i>**	♂	.....	"4"	?	"none."
	♀		
<i>exitiosum</i>	♂	.....	"6"	"very slightly curved."	"none."
	♀	.....	"8"	"12"	

²² This measurement is taken from the original description.

²³ Though the extremes of the series before us are as given here, we find that a length of over 8. mm. is very exceptional in the present species.

²⁴ Giglio-Tos gives this measurement in his description of the female of this species.

²⁵ Giglio-Tos gives this measurement in his original description of the synonymous *festae*.

²⁶ In this unique type the tegmina are not of equal length.

²⁷ The following data is quoted from the various original descriptions.

		Tegmina		Ovipositor	Spines of ventro-external margins of caudal femora
		Macropterous	Brachypterous		
<i>resinum</i> **	♂	"19"	.....	?	none (by inference).
	♀		
<i>aberrans</i>*	♂	.....	.....	"subrectus."	"none."
	♀	"17-20.5"	.....	"8.5-9"	
<i>doryphorum</i>**	♂	.....	.....	"rectus."	"none."
	♀	..	"0.3"	"11"	

In the species marked with an asterisk not sufficient material is known to give the probable extremes of the above dimensions, those marked with two asterisks are known from the unique types.

In the known females of the species here considered, the ovipositors of all range from scarcely arcuate to straight excepting in *C. borelli* and *C. truncatus*, and in *C. spinosus* the arcuation is nearly as pronounced as in those species, accompanied by a distinctive shape.

Comparison with an analogous chart²⁸ in the authors' first paper on the present genus shows, that in tropical America fewer species are known to develop both macropterous and brachypterous conditions than in the United States. This is doubtless partially due to the fact that our knowledge of the tropical species is in almost every case more limited. In future time, experimentation and study will doubtless bring to light many interesting factors governing the development and relative abundance of the macropterous and brachypterous condition in the species of this genus.

Subgenus **Opeastylus**²⁹ new subgenus

The subgenus includes two species, both from temperate and subtropical South America.

Type of Subgenus—*Conocephalus vitticollis* [*Loeusta vitticollis*] (Blanchard).

Subgeneric Description.—Prosternum bispinose. Subgenital plate of male very strongly and sharply produced disto-laterad in sharp straight spikes which are weakly divergent, on the ventral surfaces of these productions are situated awl-like styles.

²⁸ Trans. Am. Ent. Soc., xli, p. 167, (1915).

²⁹ From *ὄπεις*=awl and *στέλος*=a pillar (the styles), in allusion to the awl-like styles of the male subgenital plate in the species of the subgenus.

above which the produced portions are bent suddenly upward thence again horizontal, their apices reaching as far as the extremity of the enlarged proximal portion of the styles; between these productions the distal margin of the plate is roundly emarginate at an angle of a little less than ninety degrees. Ventral margins of cephalic and median femora armed with six well spaced spines. Caudal tibiae armed at distal extremities with three pairs of spurs. Size medium for the genus.

Conocephalus longipes (Redtenbacher) (Pl. XXII, fig. 1; XX.: 1, 2, 32 and 33; XXIV, 1.)

1891. *Xiphidium longipes* Redtenbacher, Verh. k.-k. zool.-bot. Gesell. Wien, xli, p. 505, pl. iv, figs. 81 a and b. [Buenos Aires [Argentina]; Montevideo [Uruguay]; Rio Grande do Sul and Santa Catharina [Brazil].]

The present insect is closely related to *C. vitticollis*, but may be readily separated by the narrow fastigium of the vertex, more slender form, less extensive enlarged portion of male cerei overhanging the cereal tooth, somewhat narrower ovipositor in the female and armed ventro-external margins of the caudal femora.

Redtenbacher has given a portion of the major differences, but has misrepresented others in his brief and unsatisfactory original description.

Vertex rather decidedly produced for the genus.³⁰ Fastigium of vertex but little over one-half as wide as proximal antennal joint, narrowing with a distinct but weak concavity to the facial suture, when seen from front distinctly twice as deep as greatest width. Eyes small. Lateral lobes of pronotum of moderate width, cephalic margin weakly arcuate, with scarcely a trace of the ventro-cephalic angle, to the broadly rounded ventro-caudal angle which is a little less than ninety degrees, caudal margin weakly arcuate to the broad and distinct humeral sinus, convex callosity very broad. Tegmina long and slender,³¹ particularly toward the sharply rounded apex; tympanal field of males rather

³⁰ This species and *C. gracillimus* have the vertex more distinctly produced than in any other American forms known to us, and agree in having the occiput ascending evenly toward the vertex and the vertex ascending slightly more decidedly but very nearly in the same plane. In other respects the two species are greatly dissimilar.

³¹ The extremes of tegminal length for this and the other species here treated are given in tabular form on pages 237 to 239.

large for the genus, nearly quadrate. Male cercus moderately stout and rather short; with a long slender weakly incurved ventral tooth, which is directed weakly proximo-ventrad, situated just distad of the median point; above this tooth the shaft of the cercus is produced in an overhanging shelf, which extends nearly two-thirds the distance to the base of the cercus and is narrow but evenly rounded in outline; beyond the tooth the shaft of the cercus narrows regularly and rapidly to the sharply rounded apex and is somewhat flattened vertically on inner side, not depressed. No approach toward brachypterism is apparent, the decided amount of variation in tegminal length in the twenty-three specimens before us being due to a general greater or lesser size development, which in this series we believe to be the result of local environmental conditions. The caudal femora vary similarly in length, ♂ 11-12.8, ♀ 11.8-14.8 mm.; the genicular lobes are normally bispinose; the genicular areas are not darkened; the ventro-external margins are armed in the eighteen perfect individuals before us as follows:

Number of spines,	1-1	1-2	1-3	1-4	2-2	2-3	2-4
Number of specimens,	2	1	3	1	2	1	1
Number of spines,	3-3	3-4	3-5	4-5	5-5		
Number of specimens,	2	4	2	1	1		

The dorsum of the abdomen bears on each side an indistinct pale yellowish line.

The localities represented in the typical series and the material before us cover the entire known range of the species. The localities represented by our series of twenty-four recorded specimens are: Rio Grande do Sul, Brazil³²; Sapucay, Paraguay; Misiones, Buenos Aires, Chacras de Coria and San Ignacio, Province of Mendoza, Argentina. We have but three unrecorded specimens of the insect.

Puerto Cantera, Alto Paraná, Paraguay, XII, 9, 1913, (C. Schrottky), 1 ♀, [A. N. S. P.].

Carearaña, Santa Fé, Argentina, 1 ♂, 1 ♀, [A. N. S. P.].

³² Two females before us from this locality are paratypes, sent to the Academy of Natural Sciences by Saussure.

Conocephalus vitticollis (Blanchard) (Pl. XXII, fig. 2; XXIII, 3 and 4; XXIV, 2.)

1851. *Locusta vitticollis* Blanchard, in Gay, Hist. fisica polit. Chile, Zool., vi, p. 46, Orth. pl. II, figs. 5, a and b. [Coquimbo Province, Chile.]

This species, which replaces *C. longipes* in Chile, is a closely related form, but readily separable by the characters given under that species.

Vertex not as much produced as in *longipes* and accordingly slightly less ascending. Fastigium of vertex over two-thirds width of proximal antennal joint, narrowing with a distinct concavity to facial suture, when seen from front about one and two-thirds times as deep as greatest width. Eyes moderately large. Lateral lobes of pronotum similar to those of *longipes* excepting that they are distinctly broader and the ventro-cephalic angle is noticeable as a very broadly rounded obtuse-angulation, convex callosity exceedingly broad. Tegmina proportionately shorter than in *longipes*, becoming extremely slender distad toward the sharply rounded apex; tympanal field of males as in *longipes*. Male cerci much as in *longipes* but proportionately shorter and more compact, with portion overhanging tooth thicker and extending a full two-thirds of the distance to the base of the cercus. No approach toward brachypterism is apparent though the measurements³³ show decided variability due to a general greater or lesser size development³⁴; the proportionate tegminal length when compared with that of *longipes* is distinctly less than in that species. The caudal femora vary similarly in length, ♂ 10.7–14.3, ♀ 12.9–15.6 mm.; the genicular lobes are normally bi-spinose; the genicular areas are not darkened³⁵; the ventral margins are unarmed. The dorsum of the abdomen is frequently infuscated in the present species and in such material the narrow lateral yellowish lines, found weakly indicated in *longipes*, are very striking.

³³ *Vide* page 237.

³⁴ The large series from El Olivar, Chile, averages very decidedly larger than any of the other specimens before us. A warmer and more humid environment accompanied by more luxuriant vegetation apparently produces a decided size increase in many species of Orthoptera.

³⁵ In some, more richly colored specimens of this and other species, the tissue in drying is found to settle to a certain extent in these areas, and careful examination is sometimes necessary to detect the fact that such darkening is due to discoloration.

The species is known only from Chile, from the province of Coquimbo southward to Valdivia. The Andes undoubtedly separate its distribution from that of *longipes*.

Specimens Examined: 66; 22 males, 12 females, 10 immature males and 22 immature females.

El Olivar, Colehagua, Chile, I, 1905, (C. S. Reed), 19 ♂, 7 ♀, 10 juv. ♂, 22 juv. ♀, [A. N. S. P.].

Penco, Concepcion, Chile, II, 1904, (C. S. Reed), 1 ♀, [A. N. S. P.].

Concepcion, Concepcion, Chile, II, 10, 1904, (C. S. Reed), 1 ♂, [A. N. S. P.].

Hualqui, Concepcion, Chile, II, 25, 1904, (C. S. Reed), 2 ♀, [A. N. S. P.].

Coronel, Concepcion, Chile, I, 1904, (C. S. Reed), 1 ♂, 1 ♀, [A. N. S. P.].

Lota, Concepcion, Chile, I, 1904, (C. S. Reed), 1 ♀, [A. N. S. P.].

Subgenus **Xiphidion** Serville

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

1912. *Xiphidion* Karny, Gen. Ins., fasc. 135, Subfam. Conocephalinae, p. 8.

Conocephalus cinereus Thunberg (Pl. XXII, fig. 12; XXIII, 5 and 6.)

1815. *C[onocephalus] cinereus* Thunberg, Mém. Acad. Imp. Sci. St. Pétersbourg, v, p. 273. [Jamaica.]

1874. *Orchelimum ortonii* Scudder, Proc. Bost. Soc. Nat. Hist., xvii, p. 265. [Peruvian Marañon.]

Thunberg's description is very brief and unsatisfactory, but recent collections made in Jamaica have enabled us to place this species beyond question.

Constant misconception of *C. fasciatus* has, however, resulted in the present insect being recorded as that species many times, by Burmeister, Gundlach, Redtenbacher, Griffini, Saussure and Pietet, Karny, Morse and Rehn, while semi-brachypterous individuals from Cuba have been recorded as *brevipennis* by Bolivar and Gundlach, and from Cuba, Jamaica and the Bahamas by Rehn. To these mistakes have been added misidentifications as *saltator* by Redtenbacher, Brunner and Saussure and Pietet and as *fasciatum* variety *saltator* by Griffini. All of these difficulties were due to the then universally supposed importance of tegminal length and complete disregard of the not as readily observed male genitalie characters, the form of the lateral lobes of the pronotum and the color pattern in both sexes.

Examination of the type of Scudder's *Orchelimum ortonii* proves that it is an absolute synonym of the present species, based upon a unique dried-alcoholic female in the macropterous condition.

The present insect is related to *C. fasciatus*, differing from that

species mainly in the somewhat more robust form; larger and more prominent eyes; broader and differently shaped lateral lobes of the pronotum; immaculate abdomen, the distal half of which in males of *cinereus* is uniform and striking yellow in life (in various specimens varying in shade from cadmium to capucine yellow), and in the male cerci being more elongate with the distal portion decidedly depressed and lateral margins of same distinctly converging (this more noticeable as the distal portion is decidedly more elongate than in *fasciatus*), and with the apex more narrowly but still broadly rounded. The male cerci are concolorous with the distal portion of the abdomen in this species; in *fasciatus* they are green unless discolored in drying.

Vertex not strongly but distinctly ascending. Fastigium of vertex normally about two-thirds, varying occasionally from less than two-thirds to fully the width of the proximal antennal joint, narrowing with a distinct but very weak concavity to facial suture, when seen from front about one and one-half times as deep as greatest width. Eyes moderately large and prominent. Lateral lobes of pronotum broader than in *fasciatus*, cephalic margin moderately oblique and nearly straight to the broadly rounded obtuse-angulate ventro-cephalic angle, thence nearly straight to the sharply rounded ventro-caudal angle which is distinctly less than ninety degrees, caudal margin weakly sinuous, nearly straight to the shallow humeral sinus, convex callosity very narrow. Tegmina macropterous, varying to a semi-brachypterous condition in all large series from various portions of the range of the species, apex of tegmina always sharply rounded. Male cerci as described above. The genicular lobes of the caudal femora are normally bispinose³⁶; the genicular areas are not darkened; but sixteen of a series of over one hundred perfect specimens before us have the ventro-external margins of the caudal femora armed as follows:

Number of spines,	0-1	0-2	1-1	1-2	2-2	2-3
Number of specimens, ³⁷	6	1	6	1	1	1

³⁶ As in almost all of the species showing this condition, rare individuals are found having one, two or three of these lobes unispinose, and very rarely this is true for all four of the genicular lobes of the caudal femora. In species having these lobes normally unispinose, a bispinose condition of even one or two of the lobes is very rarely found.

³⁷ From the Bahamas, one; Jamaica, five; Costa Rica, one; Panama, one; Venezuela, one; French Guiana, two; Peru, five (of six before us.).

In females the yellow area of the distal portion of the abdomen is reduced in size and decidedly less brilliant than in males.

The specimens from Puntarenas, and Rio Grande, Costa Rica, have the vertex unusually narrow, appreciably less than two-thirds the width of the proximal antennal joint; a number of specimens have the vertex decidedly wider than usual, and the specimens from St. Thomas, West Indies, and Medellin, Mexico, have this width fully equal to that of the proximal antennal joint. In spite of such variation in this and a few other species, the character may be said to be on the whole of considerable diagnostic value, particularly when considered in conjunction with other important characters. No single characters may be relied upon for specific determinations in the present genus without disastrous results.

Measurements (in millimeters) of extremes

	Length of tegmen		Length of caudal femur		Length of ovipositor
	♂	♀	♂	♀	
Havana, Cuba	10.9-17.3	11.1-19.7	10.1-12.9	10.9-14.3	8-10.7
Montego Bay, Jamaica . . .	9.4-17.1	9-17.1	9.2-12.1	9.9-12.3	7-9.2
Costa Rica, . . .	13.9-19.2	12.3-18.6	12.2-13.2	12.7-13.2	9.1-9.7
Ancon, Panama	14.9-18.7	15.7-19.8	13-13.4	13.6-14.4	10.1-11.2
La Pedrita, Ven- ezuela	13-16.9	15.7-16.9	12-12.2	12.7-13.1	8.8-8.9
Cayenne, French Guiana	17.2	19.4	13.2	14.6	10.1
Eastern Peru . .	19-20.9	19.1	13.3-15.4	14.7	9.4

At Montego Bay, Jamaica, a series was taken in short grass along the Montego River—these specimens are distinctly depauperate; specimens taken in areas of heavier grass near the jungle at the same locality are of normal size. Observation of the species elsewhere in the field in Jamaica and Panama, convinces us that the considerable variation in size and tegminal length is due chiefly to immediate environment; local luxuriance of vegetation appears to be usually accompanied by local aggrandizement of individuals of the species of this and many other genera of Orthoptera.

The present insect is known from the Bahamas, Cuba, Hayti, Porto Rico and adjacent smaller islands, Jamaica, continental America from Vera Cruz, Mexico, southward through Costa Rica

and Panama to northern South America, where it is known south-eastward as far as Cayenne, French Guiana, and southwestward as far as Contamano, Peru. It is the dominant species of the genus only in the Bahamas, Greater Antilles and northernmost Lesser Antilles.

In the present instance, we have included below material previously misidentified and now before us, to assist in future distributional and other studies.

Specimens Examined: 200; 104 males, 77 females, 6 immature males and 13 immature females.

Nassau, New Providence Island, Bahamas, I, 31, 1904, (Hebard; in short grass), 2 ♂, 2 ♀,³⁸ [Hebard Chn.]; VI, 28, 1904, (G. M. Allen), 1 ♂, 1 ♀,³⁹ [M. C. Z.], (all semi-macr.).⁴⁰

Guane, Pinar del Rio, Cuba, IX, 24 to 26, 1913, (F. E. Lutz), 6 ♂, 5 ♀, 1 juv. ♀, [Am. Mus. Nat. Hist.], (3 ♂, 3 ♀ semi-macr.).

North of Viñales, Pinar del Rio, Cuba, IX, 16 to 22, 1913, (F. E. Lutz), 1 ♂, [Am. Mus. Nat. Hist.].

Pinar del Rio, Pinar del Rio, Cuba, IX, 9 to 24, 1913, (F. E. Lutz), 4 ♂, 5 ♀, [Am. Mus. Nat. Hist.].

Cabañas, Pinar del Rio, Cuba, IX, 5 to 8, 1913, (F. E. Lutz), 4 ♂, [Am. Mus. Nat. Hist.], (3 semi-macr.).

Havana, Cuba,⁴¹ I, 23, 1904, (Hebard), 6 ♂, 1 ♀, 1 juv. ♀, [Hebard Chn.]; (C. F. Baker), 1 ♂, 2 ♀, [A. N. S. P.], (2 ♂, 1 ♀ semi-macr.).

Cayamas, Oriente, Cuba, XII, 21 to II, 28, (E. A. Schwarz), 2 ♂, 2 ♀, [U. S. N. M.], (1 ♀ semi-macr.).

Cristo, Oriente, Cuba, X, 3, 1913, (F. E. Lutz), 2 juv. ♀, [Am. Mus. Nat. Hist.].

Guantanamo, Oriente, Cuba, X, 4 to 8, 1913, (F. E. Lutz), 5 ♂, 3 ♀, 2 juv. ♀, [Am. Mus. Nat. Hist.], (3 ♂, 4 ♀ semi-macr.).

Baracoa, Oriente, Cuba, IX, 15 to X, 4, 1901, (A. Busek), 2 ♂, 3 ♀, [U. S. N. M.], (3 ♀ semi-macr.).

San Francisco Mountains, San Domingo, IX, 1905, (A. Busek), 5 ♂, 3 ♀, [U. S. N. M.].

Mona Island, Porto Rico, II, 21 to 26, 1914, 1 ♂, 3 juv. ♂, 2 juv. ♀, [Am. Mus. Nat. Hist.], (♂ semi-macr.).

³⁸ Recorded by Rehn as *X. brevipenne*, Bull. Am. Mus. Nat. Hist., xxii, p. 116, (1906).

³⁹ Recorded by Morse as *X. fasciatum*, Psyche, xii, p. 20, (1905).

⁴⁰ The less usual conditions of tegminal development are given in parentheses at the end of each record in the present paper except where, in certain species, it has been thought best to give the condition for each specimen. Macr.=macropterous and brach.=brachypterous. Dried alcoholic material is also indicated by "dr. alc."

⁴¹ The semi-macropterous material of this series has been recorded as *X. brevipenne* (in part), the macropterous as *X. fasciatum* (in part) by Rehn, Cent. Exp. Sta. Rept. Cuba, p. 216, (1909).

Mayaguez, Mayaguez, Porto Rico, XII, 48, 1911, II, 23, 1912, (C. W. Hooker), 1 ♂, 1 ♀,⁴¹ [U. S. N. M.], (semi-macr.); I, 1899, (A. Buseck), 1 ♂, 1 ♀, [U. S. N. M.].

Arecibo, Arecibo, Porto Rico, VII, 30 to VIII, 1, 1914, 2 juv. ♂, [Am. Mus. Nat. Hist.].

San Juan, Porto Rico, VIII, 2 and 3, 1914, 1 juv. ♂, 1 juv. ♀, [Am. Mus. Nat. Hist.].⁴²

Bayamon, San Juan, Porto Rico, I, 1899, (A. Buseck), 2 ♂, [U. S. N. M.], (1 semi-macr.).

Rio Piedras, Humacao, Porto Rico, VI, 1902, (O. W. Barrett), 2 ♂, 1 ♀,⁴³ [A. N. S. P.]; IX, 24, 1912, (T. H. Jones), 1 ♂, [U. S. N. M.].

Arroyo, Guayama, Porto Rico, II, 1899, (A. Buseck), 1 ♂, 2 ♀⁴³ [U. S. N. M.], (1 ♀ semi-macr.).

Culebra Island, Porto Rico, II, 1899, (A. Buseck), 2 ♀,⁴³ [U. S. N. M.], (semi-macr., dr. alch.).

Vieques Island, Porto Rico, III, 27, 1900, (C. W. Richmond), 1 ♀,⁴³ [U. S. N. M.].

St. Thomas, West Indies, VIII, 2, (A. Buseck), 1 ♂, 1 ♀, [U. S. N. M.].

Lapland, Catadupa, Jamaica, III, 9, 1911, 1 ♀, [Am. Mus. Nat. Hist.], (semi-macr.).

Montego Bay, Jamaica, III, 6, 1911, [Am. Mus. Nat. Hist.], 1 ♀; XI, 3 and 4, 1913, (Hebard), 6 ♂, 5 ♀, [Hebard Cln.], (5 ♂, 3 ♀ semi-macr.).

Mandeville, Jamaica, XI, 6, 1913, (Hebard; grassy pasture), 1 ♂, [Hebard Cln.].

Rio Cobre near Bogwalk, Jamaica, X, 25, 1913, (Hebard; open grassy areas), 2 ♂, 1 ♀, [Hebard Cln.], (1 ♂, semi-macr.).

Grange Lane, Jamaica, X, 25, 1913, (Hebard; heavy grass near forest), 1 ♂, 1 ♀, [Hebard Cln.].

Kingston, Jamaica, X, 23, 1913, (Hebard; grassy pasture), 8 ♂, 7 ♀, [Hebard Cln.], (7 ♂, 5 ♀ semi-macr.).

Stony Hill, Jamaica, X, 25, 1913, (Hebard), 2 ♂, [Hebard Cln.], (semi-macr.).

Hope Gardens, Jamaica, II, 22, 1911, 1 ♂, [Am. Mus. Nat. Hist.], (semi-macr.).

Medellin, Vera Cruz, Mexico, IX, 1895, (L. Bruner), 1 ♀, [Hebard Cln.], (semi-macr.).

Old Vera Cruz, Vera Cruz, Mexico, XII, 8, 1909, (F. C. Bisshopp), 1 ♂, [U. S. N. M.], (semi-macr.).

San Rafael, Vera Cruz, Mexico, (C. H. T. Townsend), 1 ♂, 1 ♀, [Hebard Cln.], (semi-macr.).

⁴² Recorded by Rehn as *X. fasciatum*, Trans. Am. Ent. Soc., xxix, p. 134, 1903.

⁴³ Recorded by Rehn as *X. fasciatum*, Bull. Am. Mus. Nat. Hist., xxviii, p. 76, (1910).

Isla del Coco, Costa Rica, III, 1902, (P. Biolley), 2 ♂, 2 ♀, [A. N. S. P.], (semi-maer.).

Gulf of Nicoya, Costa Rica, 1 ♀, [Hebard Cln.].

Puntarenas, Costa Rica, II, 1907, (P. Biolley; strand, leaves of *Ipomaea*),⁴⁴ 1 ♀, [A. N. S. P.], (semi-maer.).

San José, Costa Rica, III and VI, 1904 to 1906, 1160 meters elevation, (P. Biolley), 3 ♀,⁴⁶ [A. N. S. P.], (1 semi-maer.).

Río Grande, Costa Rica, III, 6, 1902, (M. Cary), 1 ♂, [Hebard Cln.], (semi-maer.).

Carillo, Costa Rica, III, 1902, (P. Biolley), 1 ♀, [Hebard Cln.].

Guatel, Costa Rica, (C. F. Underwood), 1 ♂,⁴⁵ [A. N. S. P.].

Paraiso, Costa Rica, IV, 20, 1910, (P. P. Calvert), 1 ♀, [A. N. S. P.], (semi-maer.).

Juan Viñas, Costa Rica, VII, 31, 1909, (P. P. Calvert), 1 ♀, [A. N. S. P.].

Siquires, Costa Rica, VIII, 3, 1903, (M. A. Carriker, Jr.), 2 ♂, [Hebard Cln.].

Ancon, Canal Zone, Panama, XI, 12, 1913, (Hebard; open marshy grassland), 6 ♂, 6 ♀, (1 ♂, 2 ♀ nearly semi-maer.).

La Piedrita, Venezuela, II, 16, 1911, (S. Brown), 14 ♂, 2 ♀, 4 juv. ♀, [A. N. S. P.], (8 ♂ semi-maer.).

Calí, Cauca Valley, Colombia, V, 26, 1914, (H. S. Parish), 3 ♂, [A. N. S. P.], (2 semi-maer.).

Cayenne, French Guiana, 1 ♂, (W. Schaus), [U. S. N. M.]; 1 ♀, (Ex Sausure, labelled *fasciatus*), [A. N. S. P.], (dr. alch.).

Río Marañón, Peru, 1 ♀, [M. C. Z.], type of *Orchelimum ortoni* Scudder, (dr. alch.).

Río Pacaya, Peru, VII, 1912, 1 ♀, [A. N. S. P.].

Contamano, Río Ucayali, Peru, X-XII, 1912, 3 ♂, 2 ♀, [A. N. S. P.], (dr. alch.).

Conocephalus fasciatus fasciatus (DeGeer)⁴⁶

1773. *Locusta fasciata* De Geer, Mém. l'Hist. Ins., iii, p. 458, pl. 40, fig. 4. [Pennsylvania.]

This species has been widely confused in studying tropical American material with the allied but distinctive *C. cinereus*, and with the very different *C. saltator*. Careful study of the very

⁴⁴ The finding of a specimen on strand vegetation, from which spot we have an example of *C. spinosus*, is not surprising. *C. spinosus* has been taken in salt marsh at Coronado Beach, California, a few feet from grasses and strand plants where *C. fasciatus vicinus* is to be found. The present species supplants *C. f. fasciatus* and its race and is found under similar local environmental conditions.

⁴⁵ Recorded by Rehn as *X. fasciatum*, Proc. Acad. Nat. Sci. Phila., 1905, p. 826, (1906).

⁴⁶ For a more detailed discussion of the present species, vide Rehn and Hebard, Trans. Am. Ent. Soc., xli, p. 170, (1915).

large series of these species before us shows conclusively, that the present insect is found only in North America southward through northern Mexico on the Gulf coast as far as Vera Cruz, and also on the island of Bermuda. With no material of the genus from northern Mexico, we are unable to state how far southward the ranges of *fasciatus fasciatus* and *fasciatus vicinus* extend, though both races occur along the Mexican boundary. The single small specimen from Vera Cruz, in the fairly large series of the genus from that region before us, would suggest that the species is not found farther south. Study of the Bermudan fauna shows *fasciatus* s.s. to be the sole representative of the genus on that island, one male and three females before us not differing at all from typical material of the species.

Under *cinereus* and *saltator* the frequent misconceptions of the present species are discussed. Normally the form of the lateral lobes of the pronotum in *fasciatus* s.s. and *fasciatus vicinus* is particularly distinctive when compared with that of the other American species of the genus.

Vertex not strongly but distinctly ascending. Fastigium of vertex fully to very slightly more than two-thirds the width of the proximal antennal joint, narrowing with a distinct but very weak concavity to facial suture, when seen from front about one and one-half times as deep as greatest width. Eyes decidedly small. Lateral lobes of pronotum rather narrow, cephalic margin evenly and distinctly convex to the rather broadly rounded ventro-caudal angle,⁴⁷ thence weakly but distinctly convex to the distinct humeral sinus; convex callosity moderately broad. Tegmina always macropterous in typical *fasciatus*, varying to semi-brachypterous in the western race *fasciatus vicinus*, in which race this condition is the normal. Male cerci rather short and stout, mesal portion very slightly larger than proximal portion, with a very broad and heavy mesal (vertical) internal tooth which is perpendicular to the shaft of the cercus and directed interno-mesal with sharp thorn-like apex weakly decurved. In both races of

⁴⁷ Variation occurs in which this margin becomes weakly concave before reaching the ventro-caudal angle and, in such specimens, the ventro-cephalic angle is in consequence weakly indicated and the form of the lateral lobes more similar to the general type found in the species of the present subgenus.

fasciatus the abdomen, particularly in males, is distinctly tris-triate, which contrasts strongly in that sex with the green cerci.⁴⁸

In addition to nearly one thousand recorded specimens which have been recently examined by us, we here record a single female.

Vera Cruz, Vera Cruz, Mexico, XII, 1887, (L. Brumer), 1 ♀, (Hebard Coll.).

Conocephalus ictus (Scudder) (Pl. XXII, figs. 3, 13 and 20; XXIII, 7, 8 and 9; XXIV, 3.)

1859. *Xiphidium mexicanum* Saussure, Rév. et Mag. de Zool., 2^e ser., xi, p. 208. [Mexico].

1875. *Xiphidium ictum* Scudder, Proc. Bost. Soc. Nat. Hist., xvii, p. 461. [Mexico; Guatemala].

Saussure's name, *Xiphidium mexicanum*, based upon macrop-terous examples of this species,⁴⁹ is unfortunately not available at the present day; the present use of the name *Conocephalus* for the genus then called *Xiphidium* prevents the use of his specific name, as on the same page of the work in which the present species is described, and having line priority, we find *Conocephalus mexicanus* described, which species is now placed in the genus *Neconocephalus*. Scudder described brachypterous examples of the same species as *Xiphidium ictum*, which specific name must be used as the first available for the species.

The position of the present insect is between *C. cinereus* and *C. spinosus*, from both of which species it differs decidedly in general appearance; the males suggesting very heavy and deeply colored males of *C. strictus*, while the females suggest, to some degree, large and very heavy examples of that sex of *C. brevipennis*. From *cinereus* this species differs in the much more robust structure, more truncate form, normally broader vertex, decidedly more quadrate lateral lobes of the pronotum and decidedly larger tympanum of the male tegmina with much longer stridulating vein. The male cerci of the two species are

⁴⁸ In life, certain species of the genus have the cerci green; this excellent character can not be used for dried material as the green coloration often fades or even completely disappears in drying.

⁴⁹ We have before us a brachypterous male specimen taken by Sumichrast in Mexico, received from Saussure and identified by him as his *X. mexicanum*, probably originally from the same series on which Scudder's name is in part based.

quite similar, the ovipositor of *ctus* is of the normal type but averages decidedly longer and distinctly broader than in *cinereus*. When compared with *spinosus* the present species is found to differ in the more robust structure, much more truncate form, very much more quadrate lateral lobes of the pronotum, longer stridulating vein of male tegminal tympanum, different coloration and very different genitalic characters of both sexes. The species is decidedly variable in several usually very constant characters for the species of the genus.

Size medium to large, form very robust. Vertex not strongly but distinctly ascending. Fastigium of vertex broad, greatest width fully that of proximal antennal joint,⁵⁰ one and one-half times as deep as wide, narrowing with a distinct concavity to facial suture. Eyes of medium size, moderately protruding. Lateral lobes of pronotum rather broad, cephalic margin straight to the broadly rounded ventro-cephalic angle, then straight and more nearly horizontal than usual to the sharply rounded nearly rectangulate ventro-caudal angle, caudal margin distinctly but weakly convex to the shallow humeral sinus, convex callosity moderately broad and distinct. Tegmina normally semi-brachypterous, reaching distal extremity of male abdomen and covering about two-thirds of female abdomen, broad, with distal portion narrowing rather sharply and immediate apex sharply rounded. We have before us several specimens in which the tegmina are unusually truncate and in these the immediate apex is very broadly rounded. Rarely specimens are macropterous. Male tegminal tympanum very large, not elongate, stridulating vein

⁵⁰ A series of four ♂, one ♀ and one juv. ♀ from Texolo, Vera Cruz, Mexico, have the vertex unusually narrow, two-thirds the width of the proximal antennal joint in the males and about four-fifths the width of the same in the females, with sides, as would be expected, less concave. The specimens are otherwise inseparable from other smaller individuals of the species.

unusually long with veins prominent. Male cerci⁵¹ as in *cinereus* (*vide* key). Subgenital plate with distal margin truncate between the rather long disto-lateral styles (these .7 mm. in length). The caudal femora are heavy, with genicular areas usually very dark in color; the genicular lobes are normally bispinose; the ventro-external margins of the caudal femora are armed in the eighty-nine perfect specimens before us as follows:

Number of spines,	0-0	0-1	1-1	1-2	1-3	1-4	2-2
Number of specimens,	12	6	2	5	7	1	1
Number of spines,	2-3	2-4	2-6	3-3	3-4	3-5	4-4
Number of specimens,	16	3	1	7	6	3	6
Number of spines,	4-5	4-6	4-7	5-5	5-6	5-7	
Number of specimens,	4	2	1	2	3	1	

The series of 12 specimens with these margins unarmed are from the State of Vera Cruz; the great majority having more than eight spines in all are from Lower California.

The large series before us shows variability in size, vertex, lateral lobes of pronotum, tegmina and particularly apex of the same, male cerci, ovipositor length, coloration of genicular areas of the caudal femora and armament of the ventro-external margins of the same; which is convincing evidence that the present insect is one of the most plastic of the American species of the genus.

Measurements (in millimeters) of extremes

♂	Length of body	Length of pronotum	Length of tegmen	Length of caudal femur	Length of cercus
San José del Cabo,					
Lower California	13-14.5	3.6-4.2	8.3-11.4	11.6-14.2	1.7-1.9
Tepic, Mexico...	14.3	3.8	16.8*	13.2	1.7
Orizaba, Mexico.	12.4-15.4	3.6-4.1	8.2-9.3	11.6-14.6	1.6-1.8
Medellin, Mexico	13.7	3.7	7.9	13	1.7

⁵¹The entire series of males before us from Lower California and Tepic, Mexico, have the distal portion of the cercus somewhat wider than normal with apex more broadly rounded (though not nearly as broadly rounded as in *C. spinosus*). No other noteworthy variation occurs in the series and, as we have found that in eastern Mexico there is occasionally a marked contrast in the degree of production and narrowness of the distal portion of the cercus, we do not consider that sufficient differentiation has taken place to warrant the recognition of a western geographic race.

A male before us from Santa Rosa, Mexico, has the distal portion of the cercus unusually produced for the species and narrowing decidedly to the very sharply rounded apex. In a single specimen of the very large series of *C. brevipennis* before us, a similarly unusual development has occurred.

	Length of body	Length of pronotum	Length of tegmen	Length of caudal lobe	Length of cerci
♂					
Santa Rosa, Mexico,	15.5	4.2	19.9*	15.7	1.9
La Zacualpa, Mexico,	15.5	3.7	15.2*	13.9	1.9
Tonala, Mexico Cacao Tree	14.5	3.8	17.8*	13.8	1.8
Aguas, Guate- mala	11.8-15	3.3-3.8	6.8-3	12.2-13.6	1.6-1.8
San Marcos, Nic- aragua	13-14.3	3.3-3.7	7.3-8.6	12-12.6	1.7-1.8
♀					Length of ovipositor
San José del Cabo, Lower California	12-15.3	3.7-4.3	8.8-19.1*	14-15.3	12.5-13.9
Orizaba, Mexico	13-13.3	3.3-3.7	6.3-6.5	12.9-13.2	10.6-12
Jalapa, Mexico	12.7	3.7	5.9	12.8	9.3
Medellin, Mexico	13-18	3.7-3.9	5.8-6.3	13-14.7	10.1-12.8
Secanquin, Guate- mala	13.7	3.8	4.8	12.5	10.3
San Marcos, Nicaragua	14-16	3.7-3.8	6.8-8	13.7-13.9	12-12.3

Of the four males and one female which are macropterous and are marked with an asterisk above, the length to the apex of the wing is 20.6, 24.8, 19.9, 23.3 and 24.3 mm. respectively.

In coloration the present species has the medio-longitudinal stripe of head and pronotum very striking; shining and very dark blackish brown, usually very narrowly margined with yellowish. The general coloration is pale green. The male sex has the ventro-proximal portion of the abdomen green, the concealed portion argus brown bilineate dorso-laterad with buff, the entire distal portion including the cerci uniform tawny, varying in different examples to ochraceous tawny. In females the abdomen is suffused with brown dorsad, bilineate with a paler shade dorso-laterad.

The species is not known from without the range defined by the localities given below.

In addition to a number of specimens previously recorded as this species or as the synonymous *X. mexicanum*, we here record the following series of 103 specimens: 43 males, 46 females, 4 immature males and 10 immature females.

San José del Cabo, Lower California, Mexico, 19 ♂, 18 ♀, 3 juv. ♂, [Hebard Chn.], (1 ♀ macr., 1 ♀ semi-macr., all dr. alch.).

Tepic, Tepic, Mexico, 2 ♂, 1 ♀, [Hebard Chn.], (1 ♂, macr., all dr. alch.).

Venis Mecas, Mexico, I, 6, 1878, (E. Palmer), 1 ♀, [M. C. Z.].

Jalapa, Vera Cruz, Mexico, VI, 1894, 1 ♂, 1 ♀, [Hebard Chn.], (dr. alch.).

Cordoba, Vera Cruz, Mexico, VI, 11 and 12, (F. Knab), 1 ♂, 1 ♀, 2 juv. ♀, [U. S. N. M.].

Orizaba, Vera Cruz, Mexico, I, 1892, 2 ♀, [Hebard Chn.].

Medellin, Vera Cruz, Mexico, IX to XI, 1895, (L. Bruner), 1 ♂, 5 ♀, [Hebard Chn.].

Otoyac, Vera Cruz, Mexico, XI to XII, 1887, (L. Bruner), 2 ♂, 2 ♀, [Hebard Chn.].

Santa Rosa, Vera Cruz, Mexico, VIII, (Wm. Schaus), 1 ♂, [Hebard Chn.], (macr.).

La Buena Ventura Plantation, near Santa Rosa, Vera Cruz, Mexico, VII, 13, 1909, (A. Petrunkevitch; swept from grasses), 1 ♀, [Am. Mus. Nat. Hist.].

Cuernavaca, Morelos, Mexico, VII, 7, 1900, 5000 ft., (C. C. Deam), 1 ♀, [U. S. N. M.], (dr. alch.).

Cuautila, Morelos, Mexico, VII to VIII, 3, 1903, (W. L. Tower), 4 ♂, 5 ♀, 5 juv. ♀, [Am. Mus. Nat. Hist.].

Jojutla, Morelos, Mexico, VIII, 6, 1903, (W. L. Tower), 2 ♂, 2 ♀, [Am. Mus. Nat. Hist.].

Matamoros, Morelos, Mexico, VIII, 12, 1903, (W. L. Tower), 1 ♂, [Am. Mus. Nat. Hist.].

Tonala, Chiapas, Mexico, VIII, 1, 1909, (A. Petrunkevitch), 1 ♂, [Am. Mus. Nat. Hist.], (macr.).

La Zacualpa, Chiapas, Mexico, VIII, 11, 1909, (A. Petrunkevitch), 1 ♂, [Am. Mus. Nat. Hist.], (macr.).

Secanquin, Guatemala, IV, 14, 1905, (A. McLachlan), 1 ♂, 1 ♀, 2 juv. ♀, [U. S. N. M.], (dr. alch.).

San Felipe, Retalhuleu, Guatemala, II, 23, 1905, 1 ♀, [U. S. N. M.], (dr. alch.).

Cacao Trece Aguas, Alta Vera Paz, Guatemala, III, 24 and IV, 25, (Schwarz and Barber), 4 ♂, 1 juv. ♂, 1 juv. ♀, [U. S. N. M.].

Quirigua, Izabal, Guatemala, II, 1912, (W. P. Cockerell), 1 ♀, [U. S. N. M.], (dr. alch.).

San Marcos, Nicaragua, (C. F. Baker), 2 ♂, 2 ♀⁵² [A. N. S. P. and Morse Chn.].

Conocephalus spinosus (Morse)⁵³

1901. *Xiphidium spinosum* Morse, Can. Ent., xxxiii, p. 291. [Coronado, California.]

⁵² Recorded by Rehn in Baker as *X. propinquum* and there also queried by Morse as *X. gossypii*, Invertebr. Pacifica, i, p. 78, (1905).

⁵³ For further data on this species see Rehn and Hebard, Trans. Am. Ent. Soc., xii, p. 180, (1915).

When compared with its nearest relative, *C. fasciatus*, the present species is found to differ in the more robust form, wider vertex, larger (normal) eyes, differently shaped lateral lobes of the pronotum and very narrow convex callosity of the same, immaculate abdomen with distal portion pale yellow (in males this coloration including the cerci and showing in this respect a greater similarity to *C. cinereus*), heavier and decidedly longer cerci with straight distal portion broader and very decidedly depressed for a much greater distance, ventro-external margins of the caudal femora bearing normally a number of heavier spines and ovipositor which is heavier and differs in outline from all other American species in being noticeably widest meso-distad.

Vertex weakly ascending. Fastigium of vertex as wide as proximal antennal joint, narrowing with a decided concavity to facial suture, when seen from front about one and one-third times as deep as wide. Lateral lobes of pronotum deep, cephalic margin straight, ventro-cephalic angle broadly rounded, ventral margin straight and oblique to the sharply rounded ventro-caudal angle, caudal margin sinuous and nearly perpendicular to the distinct humeral sinus. Cereal tooth much as in *fasciatus* but situated relatively proximad, this due to the elongation of the mesal and distal portions of the cercus in the present species. The genicular lobes of the caudal femora are normally bispinose; the genicular areas are not darkened; the ventro-external margins of the caudal femora are armed in the eight perfect specimens from lower California before us as follows:

Number of spines,	2 2	2-3	2 4	3 3	3-4	4 4	4 6
Number of specimens,	1	1	1	1	2 ⁵¹	1	1

The above material agrees fully with the types except that the specimens average in all proportions somewhat larger. The single specimen, recorded below from Costa Rica, is perfectly typical except that the ventro-external margins of the caudal femora are unarmed.

⁵¹ One of these specimens bears a single spine on one of the ventro-internal margins of the caudal femora.

Measurements (in millimeters) of extremes
San José del Cabo, Lower California, Mexico

	Length of body	Length of pronotum	Length of tarsus	Length of caudal femur	Length of cercus	Length of ovipositor
♂	14.9-16.6	3.4-3.8	16.8-21.1	13.6-13.9	2.2-2.3	.....
♀	13-16.7	3.2-4	18.3-22.8	13.6-15.3	.....	9.5-10.1
Puntarenas, Costa Rica						
♂	14.9	3.3	14.3	13.2	2	.....

The present species is now known on the Pacific coast from Coronado Bay, California, to Puntarenas, Costa Rica. It is a halophytic insect, the only species of the genus known as yet from the salt marshes of the Pacific coast.

In addition to 10 recorded specimens which have been recently examined by us, we here record the following series of 11 specimens; 6 males and 5 females.

San José del Cabo, Lower California, Mexico, 5 ♂, 5 ♀, [Hebard Coll., (dr. alch.).

Puntarenas, Costa Rica, II, 1907, (P. Biolley; strand, on leaves of *Ipomoea*), 1 ♂, [A. N. S. P.].

Conocephalus insularis (Morse) (Pl. XXII, fig. 14; XXIII, 10 and 11; XXIV, 4.)

1905. *Xiphidium insularis* Morse, Psyche, xii, p. 20. [Stranger Cay, Bahama Islands].

The present insect is, as stated by Morse, closely allied to *C. gracillimus*, but differs from that species in the wider and less produced vertex (width of same two-thirds that of proximal antennal joint), broader and decidedly shallower lateral lobes of the pronotum which causes the ventro-cephalic angle to become more prominent,⁵⁵ slightly less attenuate form and proportionately shorter limbs. As in the other species of group C, *gracillimus* and *iriodes*, the convex callosity of the lateral lobes of the pronotum is very broad. A semi-macropterous form is present in this species, which is found to grade without a break into a very

⁵⁵ "Distinctly polygonal in outline instead of triangular," Morse, (in comparison with *C. gracillimus*). This is rather too brief, for, although the lateral lobes of the pronotum in *gracillimus* show a nearer approach to a triangular form, the ventro-cephalic angle is distinct in that species also, though very broadly rounded.

strongly macropterous condition. Only a strongly macropterous phase has been found in *gracillimus*. In darker specimens the abdomen is strikingly marked as in *gracillimus* with three narrow dark bands, one mesal and the others lateral, the two intervening spaces forming usually bright yellow bands. In such specimens the lateral lobes of the pronotum are usually marked mesad with a diffused dark postocular stripe. The cerci are of the same form as in *gracillimus* and bright green in coloration during life. The genicular lobes of the caudal femora are normally bispinose; the genicular areas are not darkened; unlike *gracillimus* the ventro-external margins are often armed with one to three very small spines, in the series of thirty-four perfect specimens before us 20 being armed as follows:

Number of spines,	0-1	0 2	1-1	1 2	2-2	2 3
Number of specimens,	10	2	2	3	1	2

Of twenty-four Cuban specimens before us sixteen are macropterous to varying degrees, while the entire series of thirteen examples from Jamaica are semi-macropterous.

Of the two species of the genus found in both Cuba and Jamaica, this insect is much the less numerous, being found rarely and then in small numbers in open areas of short grass. The species is now known from Nassau, New Providence Island, Mangrove Cay and Stranger Cay, Bahamas; Cuba; Hayti and Jamaica.

In addition to the type, a macropterous male, we have examined the following series of 43 specimens; 28 males, 10 females, 2 immature males and 6 immature females.

Guane, Pinar del Rio, Cuba, IX, 24 to 26, 1913. (F. E. Lutz), 2 ♂, [Am. Mus. Nat. Hist.], (maer.)

North of Viñales, Pinar del Rio, Cuba, IX, 16 to 22, 1913. (F. E. Lutz), 4 ♂, 1 ♀, 2 juv. ♀, [Am. Mus. Nat. Hist.], (2 ♂, 1 ♀, maer.)

Pinar del Rio, Pinar del Rio, Cuba, IX, 9 to 24, 1913. (F. E. Lutz), 7 ♂, 1 ♀, [Am. Mus. Nat. Hist.], (4 ♂, 1 ♀ maer.)

Cabañas, Pinar del Rio, Cuba, IX, 5 to 8, 1913. (F. E. Lutz), 2 ♂, [Am. Mus. Nat. Hist.], (1 ♂ maer.)

Havana, Cuba,⁵⁶ (C. F. Baker), 2 ♂, [A. N. S. P.], 1, 23, 1904. (Hebard), 1 ♂, [Hebard Ch.], (1 maer.)

Jesus del Monte, Havana, Cuba, I, 23, 1904. (Hebard), 1 juv. ♂, 1 juv. ♀, [Hebard Ch.].

⁵⁶ The macropterous specimen was recorded as *X. fasciatus* in part and the semi-macropterous specimens as *X. brevicaudis* in part by Rehn, Cent. Exp. Sta. Rept. Cuba, p. 216. (1909).

Cayamas, Oriente, Cuba, III, 7 to VI, 10, (E. A. Schwarz), 3 ♀, [U. S. N. M.], (maer.).

Cristo, Oriente, Cuba, X, 3, 1913, (F. E. Lutz), 1 juv. ♀, [Am. Mus. Nat. Hist.].

Baracoa, Oriente, Cuba, (A. Busck), 1 ♀, [U. S. N. M.], (maer.).

San Domingo, (M. A. Frazer), 1 ♀, [M. C. Z.].

Montego Bay, Jamaica, III, 6, 1911, 1 ♂, [A. M. N. H.]; X, 29, to XI, 3, 1913, (Hebard; scant grasses on hillside near forest), 5 ♂, 1 juv. ♂, [Hebard Cln.].

Kingston, Jamaica, X, 23, 1913, (Hebard; grassy pasture), 1 ♂, 1 ♀, [Hebard Cln.].

Stony Hill, Jamaica, X, 25, 1913, (Hebard; grasses in opening of forested hills), 1 ♀, 2 juv. ♀, [Hebard Cln.].

Hope Gardens, Jamaica, X, 23, 1913, (Hebard; grassy pasture), 3 ♂, 1 ♀, [Hebard Cln.].

Conocephalus iriodes⁵⁷ new species (Pl. XXI, fig. 6; XXII, 5 and 23; XXIII, 12 and 13; XXIV, 5.)

This insect with *C. gracillimus* and *C. insularis* forms a group (E) of the subgenus *Xiphidion* agreeing in the slender form, broad convex callosity of the lateral lobes of the pronotum, elongate male tegminal tympanum and distinctive color pattern. The present species resembles *insularis* somewhat the more nearly, agreeing with that species in the form of the vertex, but having the ventro-cephalic angle of the lateral lobes of the pronotum less pronounced (as in *gracillimus*). The coloration of *iriodes* is normally much more intense than in either of the above species, the tympanum of the male tegmina even more elongate, while the male cerci are very different, showing a distinct resemblance to the similar but more decidedly specialized type found in the otherwise different and distinctive *C. angustifrons*.

Type: ♂; Kaitour, British Guiana. July 31, 1911. (F. E. Lutz.) [American Museum of Natural History.]

Description of Type.—Size medium, form slender, coloration distinctive. Head with dorsum of vertex, when seen from lateral aspect, weakly but distinctly ascending above the plane of the occiput (much as in *insularis*). Fastigium of vertex approximately two-thirds the width of basal antennal joint, narrowing with a distinct concavity to facial suture, when seen from front approximately twice as deep as wide. Eyes moderately large, not unusually protruding. Lateral lobes of pronotum vertical, cephalic margin broadly convex to the ventro-caudal angle which is very sharply rounded, caudal margin weakly convex to the broad and shallow humeral sinus, convex callosity very broad. Tegmina elongate and slender, narrowing decidedly to sharply rounded apex,

⁵⁷ From *ιριώδης*=like the rainbow, in allusion to the strikingly beautiful iridescence of the wings and transparent portions of the male tegminal tympanum.

tympanum very elongate (decidedly more longitudinal than in *gracillimus* or *insularis*), veins and veinlets of tegmina decided; wings more than usually narrow. Cerci heavy and not very elongate (decidedly shorter than in *insularis*, a little longer than in *C. fasciatus*), with mesal portion not contrastingly swollen, armed with a heavy mesal (vertical) tooth, which is flat and broad at the base, situated interno-mesad and directed slightly cephalad of perpendicular to shaft, distal third of cercus showing a distinct but weak outward curvature with broadly rounded apex briefly but decidedly depressed. Subgenital plate with distal margin weakly but distinctly convex between the short disto-lateral styles. Cephalic and median limbs as in *insularis*, caudal limbs similar to those of that species (swollen proximal portion narrowing more abruptly and decidedly than in *gracillimus*), with genicular lobes bispinose but with ventral margins unarmed. Caudal tibiae with the three pairs of distal spurs small, the dorsal pairs and interno-ventral spurs being only slightly heavier than the larger tibial spines.

Allotype: ♀; data same as type but taken August 7, 1911.

Description of Allotype.—Very similar to type with little difference in size. Tegmina similar with exception of sexual differences. Ovipositor very similar to that of *insularis*, short, very slender, virtually straight but with distal third having a very weak upward curvature. Subgenital plate flat, with lateral margins turned upward roundly but sharply and embracing the base of the ovipositor, brief distal margin of flat surface transverse.

Measurements (in millimeters)

	Length of body	Length of pronotum	Length of tegmina	Length of caudal femur	Length of cercus
♂					
Kaitour, British Guiana. <i>Type</i>	15.2	3	16.1	12.4	1.8
Kaitour, British Guiana. <i>Paratypes</i>	14-11.7	3.1-3.3	15.2-16.4	12.4-13.2	1.6-1.7
Rockstone, British Guiana	13.7	3.2	16	12.9	1.7
♀					Length of ovipositor
Ciudad Bolivar, Venezuela	14.5	3.3	19.3	11	7.9
Maripa, Rio Cauca, Venezuela	14	3.2	17.2	13.2	7.6
Kaitour, British Guiana. <i>Allotype</i>	13	3.3	16.3	12.7	7.4
Ireng River near Roraima, Brazil	13.2	3	16.2	12.8	7.3
Bonito, Pernambuco, Brazil	14.6	3	18.7	13.1	7.8

Coloration.—♂. Head and pronotum burnt lake, with the exception of the occiput and dorsum of the pronotum, which have the medio-longitudinal stripe very deep burnt lake and the remaining portions buff yellow. Eyes prussian brown varying to cinnamon in different individuals. Tegmina infuscated, with veins shamrock green, hyaline areas of tympanum iridescent; wings with hyaline portion iridescent and with costal margin and brief distal exposed (when at rest) portion rather strongly infuscated. Abdomen buff yellow considerably infuscated, with broad median and lateral stripes of burnt lake, cerci burnt lake. Limbs tawny, washed with burnt lake.

♀. Head, lateral lobes of pronotum (below a very narrow postocular stripe of burnt lake) and femora shamrock green somewhat infuscated. The buff yellow lateral margins of the burnt lake medio-longitudinal stripe of the occiput and dorsum of the pronotum are decidedly broader than in the male, on the pronotum extending over the dorsal portions of the lateral lobes. Tegmina, including veins, infuscated; wings as in the male. Abdomen colored much as in that sex. Tibiae and ovipositor hazel, weakly suffused with greenish.

The Venezuelan females are the palest examples before us and lack dark markings on the lateral lobes of the pronotum, while the dark abdominal stripes are greatly reduced in breadth.

Specimens Examined: 9; 4 males and 5 females.

Ciudad Bolívar, Venezuela, IX, 1909, (M. A. Carriker, Jr.), 1 ♀, [A. N. S. P.].

Maripa, Rio Caura, Venezuela, X, 1909, (M. A. Carriker Jr.), 1 ♂, [A. N. S. P.].

Ireng River near Roraima, Brazil, VIII, 9, 1911, (Crampton), 1 ♀, *paratype*, [Hebard Cln.].

Kaitour, British Guiana, VII, 31 to VIII, 7, 1911 (F. E. Lutz), 3 ♂, 1 ♀, *type*, *allotype*, *paratypes*, [A. M. N. H.].

Rockstone, British Guiana, VII, 8, 1911, (Crampton and Lutz), 1 ♂, *paratype*, [A. M. N. H.].

Bonito, Province of Pernambuco, Brazil, VII, 1883, (A. Koebele), 1 ♀, [U. S. N. M.], (dr. alch.).

Conocephalus angustifrons (Redtenbacher) (Pl. XXII, figs. 6 and 15; XXIII, 14 and 15; XXIV, 6.)

1891. *Xiphidium angustifrons* Redtenbacher, Verh. Zool.-Bot. Gesell. Wien, xli, p. 524. [Santa Fé de Bogota and Tolima, Colombia.]

The present insect bears a close general resemblance to the brachypterous condition of *C. saltator*, but may be readily sep-

arated by the very different fastigium of the vertex, coloration (which in life is probably very distinctive and in dried specimens before us is still striking in the male sex and in a few of the females), larger and more bulging eyes and male cerci which are very different from any other South American species, being of the type found in *C. brevipennis*, but differing from that species in proportions, contour of apical portion and external instead of mesal position of apex.

The ventro-cephalic margins of the cephalic and median tibiae are also distinctive in having, in every specimen before us, from one to the four of these margins armed with seven instead of the normal six spines⁵⁸; this is never found in *saltator* in the regions where the distribution of the two species is coextensive,⁵⁹ in which regions the ovipositor of the present species also averages distinctly shorter.

The species agrees in width of vertex with *C. versicolor* but is otherwise very different. Giglio-Tos considered his *X. festae*⁶⁰ (= *versicolor*) more nearly related to the present species than we find is the case after study of all the American species.

Size medium, form very robust, coloration unusual. Fastigium of vertex narrow and strongly ascending above plane of occiput but not unusually produced, greatest width slightly less than one-half that of proximal antennal joint, two and one-half times as deep as wide, narrowing very slightly to facial suture. Eyes large and protruding. Lateral lobes of pronotum of moderate width, cephalic margin straight to the broadly rounded ventro-cephalic angle, then straight to the narrowly rounded ventro-caudal angle, caudal margin weakly concave and often subsinuate, humeral sinus exceedingly weak or wholly absent, convex callosity exceedingly narrow but distinct. Tegmina normally

⁵⁸ The careful work of Giglio-Tos is shown by his remarks on this less noticeable differentiation, Boll. Mus. Zool. Anat. comp. Univ. Torino, xi, no. 232, p. 29, (1896); a character which had been wholly overlooked by Redtenbacher.

⁵⁹ Four depauperate brachypterous individuals of *C. saltator* from Dominica and Trinidad agree in this respect, and represent the only specimens of the subgenus *Xiphidium* which possess a supplementary seventh spine, excepting material of *C. angustifrons*; moreover such depauperate females from those islands have the ovipositor length quite as short as in the present species.

⁶⁰ Boll. Mus. Zool. Anat. comp. Univ. Torino, xiii, no. 311, p. 93, (1898).

abbreviate, lanceolate, with apex sharply rounded.⁶¹ Male tegminal tympanum unusually small, short and broad, with veins prominent. Cerci short, proximal two-thirds heavy with mesal (vertical and longitudinal) internal tooth heavy at base, directed mesad and perpendicular to the shaft of the cercus, distal third of cercus directed strongly outward with broadly rounded apex external instead of mesal in position, this third decidedly flattened and slanting toward the internal margin with the flattened portion merging with the proximal swollen portion gradually, much more evenly than in *brevipennis*. Subgenital plate with distal margin truncate between the very short distolateral styles, which are set in slightly but appreciably raised sockets. Cephalic and median tibiae with from one to all of the ventral margins bearing seven, instead of the normal six, spines. Caudal femora heavy and elongate, bearing on their ventro-external margins spines which are heavier than is usual. Ovipositor short, very weakly curved and virtually straight.

Measurements (in millimeters)

	Length of body	Length of pronotum	Length of tegmen	Length of caudal femur	Length of cercus
♂					
Juan Viñas, Costa Rica	13-14	3.3-3.6	8.2-9.4	12.7-12.8	1.6-1.7
Rio Grande, Costa Rica	13-14	3.3-3.6	8.2-8.6	12.3-12.4	1.7-1.8
San José, Costa Rica	12.7	3.4	8.8	13	1.8
♀					Length of ovipositor
Juan Viñas, Costa Rica	12	3.3	7.1	13.3	8.9
Rio Grande, Costa Rica	15	3.7	8.6	13.7	9.3
Carillo, Costa Rica	16	3.9	8.7	14.6	10
Carillo, Costa Rica	15	3.6	15.9	14.8	9.6
San José, Costa Rica	11.5	3.3	7	12.1	8.6
Cincinnati, Colombia	12.8-14.2	3.3-3.4	6.5-6.9	12-13.1	8-9.6
La Combte, Colombia	15	3.4	7.6	13.7	8.6

⁶¹ The single macropterous specimen of the species known, has the tegmina moderately broad, as in the macropterous condition of *C. saltator*, with apex not quite as narrowly rounded as in the brachypterous condition.

Color Notes.—Males. Head, pronotum, thorax, tegmina and base of abdomen forest green; the medio-dorsal stripe of head and pronotum brownish olive and weakly defined with no trace of pale lateral coloration. Eyes dark brown. All femora tawny, genicular areas of caudal femora deep bay, tibiae tawny strongly washed with green. All of abdomen excepting basal portion mahogany red, cerci of the same color. In the females the coloration is less intense, the abdomen being decidedly less vivid.⁶²

The perfect material before us shows the following armament of the ventro-cephalic margins of the cephalic and median tibiae:

Number of spines,	6-6	6-7	7-7	7-8
Specimens with cephalic tibiae so armed,	0	4	12	1
Specimens with median tibiae so armed,	6	8	3	0

Two specimens of this series have one of the ventro-caudal margins of the cephalic tibiae armed with but five spines, while one individual has the ventro-caudal margin of one of the median tibiae armed with seven spines.

The genicular lobes of the caudal femora are normally bispinose, a single specimen in the series before us has one of these lobes unispinose. The ventro-external margins of the caudal femora are armed in the seventeen perfect specimens before us as follows:

Number of spines,	1-2	2-3	2-4	3-3	3-4	3-5
Number of specimens,	1	2	1	5	4	1
Number of spines,	4-4	4-5	4-7			
Number of specimens,	1	1	1			

The present species is known from Punta di Sabana and Colon, Panama, in addition to the original localities and those given below. It appears to be generally distributed at somewhat higher elevations than *saltator*. The coloration suggests to us the possibility of the insect being an inhabitant of the luxuriant vegetation in and about the forests rather than the grasslands.

Specimens Examined: 19; 6 males, 11 females and 2 immature males.

San José, Costa Rica, 1160 meters elevation. (P. Billey), 1 ♂; 1 ♀, [all Hebard Cln.].

Carillo, Costa Rica, VIII, to IX, 1903, (C. F. Underwood), 2 ♂, [Hebard Cln.], (1 maer.).

⁶²The females before us from South America are much discolored; such poorly preserved material is found to lose almost all traces of distinctive coloration.

Rio Grande, Costa Rica, III, 6, 1902, (M. Cary), 2 ♂, 1 ♀, 1 juv. ♂, [Hebard Cln.].

Juan Viñas, Costa Rica, III, 12, 1902, (L. Bruner), 3 ♂, 1 ♀, [Hebard Cln.]; VI, 28, 1909, (P. P. Calvert), 1 ♀, [A. N. S. P.].

Zent, Costa Rica, IX, 26, (F. Knab), 1 ♀, 1 juv. ♂, [U. S. N. M.].

Cincinnati near Santa Marta, Colombia, VII, 9 to 10, 1913, 4000 to 5000 ft., (M. A. Carriker Jr.), 3 ♀, [Hebard Cln.].

La Combte, Cordillera Occidentale near Cali, Colombia, V, 19, 1914, (H. S. Parish), 1 ♀, [A. N. S. P.].

Conocephalus unicolor (Bruner) (Pl. XXI, fig. 3.)

1915. *Conocephalus unicolor* Bruner, Ann. Carneg. Mus., ix, p. 374. (June.) [Corumbá, Brazil.] [Macropterous.]

1915. *Conocephalus recticaulus* Bruner, Ann. Carneg. Mus., ix, p. 374. (June.) (In part?) [Corumbá, Brazil.] [Brachypterous.]

This species, with *C. resaccensis*,⁶³ forms group E of the subgenus *Xiphidion*, these species showing a distinct tendency toward the general form of the male cerci found in groups G, H and I. The present insect has this tendency somewhat the more pronounced, as may be observed by reference to the descriptions. In general appearance the specimens before us resemble large macropterous individuals of *C. cinereus*, but the somewhat narrower vertex, longer limbs, larger male tegminal tympanum, more ample lateral lobes of the pronotum, heavily armed ventro-external margins of caudal femora, distinctive male cerci and different ovipositor show how distinct the two species really are.

Description of ♂.—Size large, form graceful but with limbs and wings large and decidedly elongate. Head with dorsum of vertex, when seen from lateral aspect, not strongly but distinctly ascending above the plane of the occiput (much as in *cinereus*), fastigium of vertex slightly less than two-thirds the width of proximal antennal joint, nearly two and one-half times as deep as wide and narrowing with a very weak concavity to facial suture. Eyes moderately large and not unusually protruding. Lateral lobes of pronotum with cephalic margin straight to the very broadly rounded ventro-cephalic angle, then straight to the sharply rounded ventro-caudal angle (which is distinctly less than a right angle), caudal margin weakly convex to the broad and very shallow humeral sinus, convex callosity distinct and moderately broad. Tegmina elongate, slender, narrowing gradually to sharply rounded apex, veins and veinlets very delicate, tympanum large and distinctly longitudinal with veins pronounced, stridulating vein short with only proximal half decidedly swollen. Cerci elongate with proximal portion stout, mesal portion elongate and decidedly but evenly enlarged, at base (vertical and longitudinal) of mesal third is situated a large flattened internal horizontal tooth directed a little cephalad

⁶³ Described in, Trans. Am. Ent. Soc., xli, p. 188, (1915).

with immediate apex sharp and decurved, distal portion of cercus elongate, horizontally strongly depressed, lateral margins converging evenly and decidedly to sharply rounded apex. Subgenital plate with distal margin weakly convex between the short disto-lateral styles. Cephalic and median limbs well developed but with spination not unusually heavy. Caudal femora elongate with proximal portion decidedly swollen, ventro-external margins armed with a number of very small stout spines, genicular lobes strongly bispinose, genicular areas very weakly infuscated.

Description of ♀.—Very similar to type, size slightly larger. Tegmina similar to ♂ except for sex differences. Ovipositor⁶¹ elongate, nearly straight but with a perceptible downward curvature.⁶⁵ Subgenital plate flat with lateral margins turned upward roundly and embracing the base of the ovipositor, very brief distal margin of flat surface transverse.

Measurements (in millimeters)

	Length of body	Length of pronotum	Length of tegmen	Length of caudal femur	Length of cercus	Length of ovipositor
♂	16.1	3.9	17	15.7	2.3	
♀	17.4	3.9	18.9	17.1		16.4
♀	17.1	3.7	18.4	15.3		14.7

The other female before us has the lateral lobes of the pronotum distinctly shallower with the ventral margin distinctly less oblique, the specimen is however unquestionably conspecific.

The coloration of the species is not unusual, the general color being pale green (much faded in these specimens) with the medio-longitudinal stripe of head and pronotum subobsolete.⁶³ In the male sex the distal portion of the abdomen, including the cerci, is pale yellow brown; this is weakly indicated in the females. The genicular areas of the caudal femora are very briefly and weakly infuscated.

⁶¹ In both females before us the dorsal valves of the ovipositor surpass the ventral valves by .7 mm. This is unusual in the genus but is probably of little value as a specific character.

⁶² In the other topotypic female before us, the downward curvature of the ovipositor, though still suggested, is even less pronounced.

⁶³ In but one of the three decidedly faded specimens before us this stripe is indicated on the dorsum of the vertex, with margins alone defined by weak parallel lines on the pronotum.

In the three specimens before us the armament of the ventro-external margins of the caudal femora is 4-4, 4-5 and 5-6 spines.

The species is an inhabitant of the lowlands (probably marshes) of the upper Paraguay.

Specimens Examined: 3; 1 male and 2 females.

Corumbá, Brazil, III. (H. H. Smith), 1 ♂, 2 ♀, *topotypes*. [U. S. N. M. and A. N. S. P.]

Conocephalus equatorialis (Giglio-Tos) (Pl. XXIII, figs. 16 and 17.)

1898. *X[iphidium] equatoriale* Giglio-Tos, Boll. Mus. Zool. Anat. comp. Univ. Torino, xiii, no. 311, p. 92. [Gualaquiza and San José, Ecuador.]

The present species finds nearest relationship in *C. saltator*, differing from macropterous examples of that species in the narrower vertex, darker coloration of the discoidal and anal fields of the tegmina and adjacent portions of the wings when at rest, more iridescent hyaline area of the wings, green or greenish cerci of similar general form but distinctly less specialized, and ovipositor which is normally shorter than in typical *saltator*. Furthermore the present insect is the only American species known to us which always has the ventro-internal margins of the caudal femora armed. In the examination of several thousand examples of other American species of the genus, but seven specimens, two *C. fasciatus fasciatus*, one *C. spinosus*, one *C. saltator* and three *C. attenuatus*, have been found by us bearing a single spine on one of the ventro-internal margins of the caudal femora.

Size medium to small,⁶⁷ form moderately slender. Fastigium of vertex narrow, greatest width slightly less than to slightly more than one-half⁶⁸ that of proximal antennal joint, two and one-half to two and three-fourths times as deep as broad, narrowing with scarcely any concavity to facial suture. Eyes moderately large, but slightly protruding. Cephalic margin of lateral lobes broadly convex to the ventro-caudal angle, with the ventro-cephalic angle very weakly indicated, ventro-caudal angle sharply rounded (distinctly less than a right angle), caudal margin nearly straight (very weakly convex) to the distinct but shallow humeral sinus, convex

⁶⁷The typical series from Ecuador, of which a pair are in the Academy, averages decidedly smaller than the material here recorded and the tegmina of many specimens of that series are semi-macropterous.

⁶⁸Material having this greatest width of vertex is from British Guiana, this does not appear to be the normal condition for the species.

callosity moderately broad.⁶⁹ Tegmina elongate, slender, narrowing evenly to the rather sharply rounded apex, male tympanum much as in *saltator*. The species is apparently normally macropterous, only occasional specimens being semi-macropterous over the greater portion of its range, but the type series demonstrates that in Ecuador a semi-macropterous condition is often found. Male cerci similar to those of *saltator* but not as elongate, the enlarged portion very slightly overhangs the base of the tooth and the margins of the distal portion are slightly convergent, thus making the apex rather sharply rounded. Subgenital plate with distal margin weakly convex between the rather long disto-lateral styles. Caudal femora much as in *saltator*, but with both ventro-external and ventro-internal margins armed; genicular lobes normally bispinose; genicular areas apically darkened; the ventro-external margins are armed in the thirty-one perfect specimens before us as follows:

Number of spines,	1-2	2-3	2-4	3-3	3-4	4-4
Number of specimens,	1	1	2	1	9	7
Number of spines,	4-5	4-6	5-3	5-5	5-6	
Number of specimens,	6	1	1	1	1	

The ventro-internal margins of the caudal femora are also armed, as follows:

Number of spines,	0-1	0-2	1-1	1-2	1-3	2-2
Number of specimens,	9	1	7	11	1	2

The ovipositor is short, slender and usually almost straight.

Measurements (in millimeters)

♂	Length of body	Length of pronotum	Length of tegmen	Length of caudal femur	Length of cercus
Rio Mato, Venezuela	13.2-14	3.3-3.5	13.9-19.6	13.3-14	1.8-1.9
Bartica, British Guiana	12.6-15.5	3-3.4	13.9-17.1	12.8-13.9	1.8-1.9

⁶⁹ In the original description, Giglio-Tos states that the convex callosity is narrow; it is narrow, but when compared with the other American species we can but describe it as we have done above. The shades of meaning for such characters are very difficult to express and uniformity is difficult to maintain even in one and the same paper.

	Length of body	Length of pronotum	Length of tegmen	Length of caudal femur	Length of cercus
♂					
Contamano, Peru . . .	13.5	3.4	19.2	13.9	1.9
Gualaquiza, Ecuador, <i>paratype</i>	11	2.9	12.2		1.7
♀					Length of ovipositor
Rio Mato, Vene- zuela	14	3.3	18.7	14	7.4
Bartica, British Gui- ana	13-14.5	3.3-3.7	18.7-19	13.4-14.2	7.2-8 ⁷⁰
Contamano, Peru . . .	13.8-14.2	3.3-3.4	19-19.5	13.9-14.7	7.7-7.9
Gualaquiza, Ecuador, <i>paratype</i>	12	3	13.3	12.4	7.2 ⁷¹

A female before us from Perené, Peru, has the ovipositor length 8.3 mm.

We have thought it best to give the measurements of the two paratypes before us from Ecuador, for although inseparable from the other specimens here recorded, they, and as is shown by Giglio-Tos in his description, the entire series from Ecuador, are decidedly smaller with shorter tegmina. This variation may, however, be due rather to local environmental conditions than to purely geographic influences.

The type series is dried alcoholic, fresh material before us shows the following coloration. Male: Head and pronotum (excepting the very dark medio-dorsal brownish black stripe), thorax, exposed portions of the five proximal dorsal abdominal segments, entire ventral surface of abdomen, cerci, subgenital plate, cephalic and median limbs and bases of caudal femora, lettuce green. Proximal (concealed) portion of dorsum of abdomen dark brown mesad, bordered laterad with yellowish, distal four dorsal segments of abdomen and adjacent portions of caudal femora ochraceous orange fading gradually into the green portions. Tegmina

⁷⁰ A single female in this series has the ovipositor unusually long, 9.9 mm. in length.

⁷¹ Giglio-Tos gives 7.5-8 mm. as the extremes of ovipositor length in the type series. Our measurement is taken, as elsewhere in the present paper, from the base of the basal plica to the apex of the ovipositor; his, doubtless from the juncture of subgenital plate and ovipositor to apex of the latter, thus adding on an average about .4 mm. to the ovipositor length when compared with our method of measuring the same.

and adjacent portions of wings when at rest very dark and suggesting a suffused continuation of the medio-dorsal stripe, hyaline portion of wings iridescent and wing veins burnt lake in this respect suggesting the otherwise distinctive *C. iriolus*. Genicular areas of caudal femora apically darkened. A darker phase of the species also occurs in which the green color is supplanted by yellowish brown. The female resembles the male in coloration excepting that the abdominal colors are much paler and more indistinct.

The localities given below and those of the type series define the known distribution of the species.

In addition to a paratype pair from Gualaquiza, Ecuador, we have had before us the following series of 38 specimens: 15 males and 23 females.

Rio Mato, Venezuela, X to XI, 1909, (M. A. Carriker Jr.), 3 ♂, 1 ♀, [A. S. N. P.], (1 ♂ semi-maer.).

Bartica, British Guiana, XI, 30, 1912 to III, 6, 1913, (H. S. Parish), 10 ♂, 16 ♀, [A. N. S. P.], (2 ♂ semi-maer.).

Rockstone, British Guiana, VII, 9, 1911, (Crampton and Lutz), 1 ♀, [A. M. N. H.].

Paramaribo, Dutch Guiana, (K. Mayo), 1 ♂, 2 ♀, [A. N. S. P.], (1 ♂, 1 ♀ semi-maer.).

Perené, Peru, 1 ♀, [A. N. S. P.].

Cantamano, Rio Ucayali, Peru, X to XII, 1912, 1 ♂, 2 ♀, [A. N. S. P.], (dr. alch.).

Conocephalus saltator (Saussure) (Pl. XXII, fig. 16; XXIII, 18, 19, 20; 21, 22 and 23.)

1859. *Xiphidium* *saltator* Saussure, Rév. et Mag. de Zool., 2e ser. xi, p. 208.

[Guiana.] [Macropterous ♀.]

1875. *Xiphidium meridionale* Scudder, Proc. Bost. Soc. Nat. Hist., xvii, p. 460. [Brazil.] [Brachypterous ♀.]

1901. *Xiphidium propinquum* Redtenbacher, Verh. k.-k. zool.-bot. Gesell. Wien, xli, p. 522. [Guatemala; Merida, Venezuela; St. Vincent, Lesser Antilles.] [Brachypterous series.]

1901. *Xiphidium brachypterum* Redtenbacher, Verh. k.-k. zool.-bot. Gesell. Wien, xli, p. 523. [Venezuela; Colombia; Brazil; Peru.] [Brachypterous series.]

The description of *saltator* is very brief, but, although we have been unable to examine the type, we are convinced that it constitutes the basis of the present species. The present insect is the dominant species in the Guianas, the only other form found there to which could apply Saussure's very brief description being macropterous *C. cinereus*, which species we have from Cayenne.

French Guiana, labelled *fasciatus* by Saussure. Scudder's type of *meridionalis*, now before us, is a female showing the extreme of the brachypterous condition and having a decidedly longer and weakly (though more noticeably) curved ovipositor than normal; this specimen he quite naturally believed to be an undescribed species. It remained for Redtenbacher, however, to throw the nomenclature surrounding this, the dominant and most plastic species in tropical America, into hopeless confusion. In 1891 that author, in his "Monographie der Conocephaliden," sorted out all macropterous examples of the present species, recording them as *X. fasciatum* and probably as *X. saltator* in company with other macropterous examples of *fasciatus*, *cinereus* and probably other species; he then, having divided the brachypterous material into two series, erected the synonyms *propinquum* and *brachypterum*, suggesting the affinity of *nemorale* (for which he erected the synonym *X. curtipenne* on the previous page) and *gossypii* (Scudder's synonym of *C. brevipennis*) to *propinquum*, and Scudder's *meridionale* to *brachypterum*—the value of the resultant key may be imagined. Without long study of the series which Redtenbacher had before him it will be impossible to say to what species each individual record belongs, but the data given above will need but little modification. Karny, in his "Revisio Conocephalidarum," has made few changes from Redtenbacher's work which paper has succeeded only in bringing confusion to the study of this and doubtless the other American groups of the subfamily. The species is to be found in the literature frequently quoted as the above synonyms and also as *fasciatus*.⁷²

This insect, whose position in the genus is between *C. equatorialis* and *C. borelli* in group G of the subgenus *Xiphidion*, is the most abundant and widely distributed of the tropical American species. As is often the case with such species very great variation is found, and in the present case material from various portions or often from the same portion of its range exhibits diversity in width of vertex, form of lateral lobes of the pronotum, length and form of tegmina, production of male cerci (which, however, never differentiate from the typical general contour, thus fixing

⁷² Rec rded by Giglio-Tos, Boll. Mus. Zool. Anat. comp. Univ. Torino, ix, no. 184, p. 40, (1891), as *X. fasciatum* from San Pedro Province, Paraguay, and as *X. brachypterum* from Asuncion and San Pedro Province, Paraguay, (macropterous and brachypterous examples probably).

with certainty males of the species), length and degree of weak curvature or straightness of the ovipositor, coloration of the genicular areas of the caudal femora and armament of the ventro-external margins of the same. Even in the armament of the ventro-cephalic margins of the cephalic and median tibiae, three specimens from Dominica and Trinidad have seven instead of the normal six spines, a condition elsewhere found in the American species only in *C. angustifrons*, in which form it apparently always occurs. It would seem that several species or at least geographic races must exist, but this is certainly not the case. Certain variations, it is true, are found to be the usual condition over certain regions, but these are not fixed, and the same variation can almost invariably be found in other more typical series; often two series of the most distinctive appearing variations are from the same locality and we are inclined to believe that immediate environment has as much or more to do with the majority of such differences as geographic influences.

The species has been compared with its nearest ally, *C. equatorialis*, under that species.

As the species is nowhere fully described we here give the characters for a typical male and female as a basis for further discussion of the characters and variations of the species.

Bartica, British Guiana, I, 10, 1913, (H. S. Parish), [A. N. S. P.]. Size medium, form moderately slender. Vertex not strongly but distinctly ascending. Fastigium of vertex moderately broad, greatest width two-thirds that of proximal antennal joint, when seen from front about twice as deep as broad, narrowing with a weak concavity to facial suture. Eyes moderately large and but slightly protruding. Lateral lobes of pronotum with cephalic margin broadly arcuate to the ventro-caudal angle with the ventro-cephalic angle very weakly indicated, ventro-caudal angle sharply rounded (distinctly less than a right angle), caudal margin almost straight (nearly imperceptibly subsinuate), humeral sinus subobsolete, convex callosity very narrow (often subobsolete). Tegmina elongate, moderately broad, narrowing evenly to the rather sharply rounded apex; male tegminal tympanum not large, weakly longitudinal, stridulating vein not unusually elongate. Male cerci decidedly elongate, proximal portion stout, widening strongly and briefly swollen so as to overhang a small ventro-internal tooth, which is situated at the proximal base of the mesal portion and directed meso-proximal with the sharp apex strongly decurved, from near the base of this tooth to the apex of the cercus the entire cercus (excepting the proximo-external portion) is very greatly depressed, slanting strongly toward the internal margin, this elongate portion is not in a line with the base of the cercus but is directed moderately outward so that the

external margin of the cercus is broadly concave, the distal produced portion has the margins subparallel with the apex rather broadly rounded. Subgenital plate with distal margin weakly convex between the rather short disto-lateral styles (which are very slightly shorter than in *equatorialis*). Caudal femora not elongate for the genus, proximal portion decidedly swollen, ventro-external margins bearing a few small spines. Ovipositor moderately long, very slender and very weakly curved (almost straight).

Two brachypterous examples from the same locality agree in every respect excepting in the humeral sinus, which is wholly obsolete,⁷³ and in tegminal and wing length.

Series from Venezuela and Panama agree almost perfectly with those from Guiana. The brachypterous specimens demonstrate that the degree of sharpness of the rounded apex of the tegmina varies somewhat, as does also the degree of reduction of the tegmina.⁷⁴

Large series from Trinidad show numerous specimens with the vertex very slightly narrower than normal, while the majority of the large macropterous males and two large brachypterous males have the cerci abnormally elongate, the flattened distal portion being greatly produced and curved outward with the immediate apex sharply rounded. This condition is due to elongation and is decidedly variable in degree; the extremes would suggest distinct specific status, but in general contour no differences exist and all intermediate conditions are present.

The smallest brachypterous individuals from Trinidad agree well with a depauperate condition found predominant in the Lesser Antilles. These specimens are distinctly smaller than typical brachypterous material, the male cerci are slightly more attenuate while the ovipositor is shorter, some individuals showing as well the extreme condition of tegminal abbreviation for the species.

A series of large macropterous and brachypterous specimens from Philadelphia, Costa Rica, have the cerci decidedly produced

⁷³ Macropterism is often, if not always, accompanied by an appreciable production of the caudal margin of the dorsum of the pronotum and a resultant increase in the depth of the humeral sinus.

⁷⁴ This variation, the weakly or not suffused genicular areas of the caudal femora and the very weakly arcuate or almost straight ovipositor, appears to constitute the means by which Redtenbacher separated his series into what he called *brachypterum* and *propinquum*. Careful consideration would have shown these characters to be mere variations and each found to various degrees in various specimens.

but not to the degree of the maximum from Trinidad. Other specimens from Guatel, Costa Rica, are normal in this and other characters.

Southward from Guiana through Brazil the insect appears to become slightly more robust. In a series from Contanamo, Peru, this is appreciable, while in these the brachypterous specimens have the humeral sinus very weakly indicated and the macropterous specimens have it slightly more decided. The male cerci of these specimens are also slightly more robust.

A series from Santa Ana, Peru, taken at an elevation of three thousand feet, are all very depauperate, averaging the smallest of any series before us, but otherwise normal.

The considerable series from Rio de Janeiro, Brazil and Sapucay, Paraguay, shows the features found in the series from Contanamo, Peru, still more pronounced, though with some individual variation, in the Sapucay females the ovipositor shows the greatest length found in the species excepting in the females from the Alto Paraná (Puerto Cantera), Paraguay.

The only geographic differences appear to be the slight increase in general robustness in the southward distribution in South America and various ranges in ovipositor length, which, when we consider the plasticity of the species, certainly do not warrant the erection of a geographic race.

Measurements (in millimeters) of extremes

♂	Length of body	Length of pronotum	Length of terebra	Length of caudal femur	Length of cercus
Long Ditton, Dominica	11.7-14	2.9-3.3	5.8-6.3	11-11.7	2.2-2
Philadelphia, Costa Rica	13.5	3.2	18.9	13.6	2.3
Philadelphia, Costa Rica	13.2-14.8	3.3-3.6	6.6-7.6	13.4-11.2	2.3-2.4
Rio Mato, Venezuela	15.5-16.5	3.2-3.3	16.9-19.7	12.9	2.3-2.1
La Piedrita, Venezuela	12.5	3.4	6.3	13.7	2.3
Caparo, Trinidad	14.3-16.4	3-3.4	15-18.9	12-14.3	2.1-2.6

♂	Length of body	Length of pronotum	Length of tegmen	Length of caudal femur	Length of cercus
Caparo, Trinidad	14.2-15.2	3.1-3.3	6.4-6.5	11.7-13.8	2-2.6
Bartica, British Guiana	13.3-15.3	3.2-3.7	17.3-18.8	12.6-14	2-2.2
Bartica, British Guiana	14	3.7	7.4	13.3	2.2
Pará, Brazil	13.3	3.1	17.3	12.7	2
Tijuca, Brazil	11.5-13.4	2.7-3.3	7.1-7.2	11-13.3	1.8-2.2
Chanchemayo, Peru	15.4	3.4	20.4	13.9	2.3
Contamano, Peru	13.4-13.6	3-3.3	17.4-18.9	12.8-13.4	2-2.1
Contamano, Peru	11.8-13.4	3.1-3.6	7.3-7.9	12.7-12.8	1.9-2.2
Santa Ana, Peru, 3000 ft.	10.8-12.7	3-3.4	6.3-8.6	10.3-12	1.9-2
Sapucay, Paraguay	15-16.5	3.6-3.7	20	13.4-14.4	2.1-2.2
Sapucay, Paraguay	12.9-15.4	3.3-3.6	7.3-8.8	12.1-13.7	2.1-2.3
Extreme range of variation	10.8-16.5	2.9-3.7	5.8-8.8 15-20.4	10.3-14.4	2-2.6
♀	Length of body	Length of pronotum	Length of tegmen	Length of caudal femur	Length of ovipositor
Laudet, Dominica	12.8	3.2	3.3	.....	8.4
Long Ditton, Dominica	12.2-14.3	3.7-3.8	3.3-4.2	12.9	9-9.9
Philadelphia, Costa Rica	14.5-16	3.6-3.7	19.2-20.1	14.8-15.2	12.9-13
Philadelphia, Costa Rica	14.5	3.8	6.1	15.8	12.8
Rio Mato, Venezuela	11-16.5	3.3-3.7	17.3-19.2	13.8-15	10.6-11.8
La Piedrita, Venezuela	12.5-13.8	3.4-3.6	4-5.2	13.1-15	10.4-11
Caparo, Trinidad	15.5-18	3.6-3.7	16.7-19	14.9-15.9	9.9-12.1
Caparo, Trinidad	15.5-16	3.7-3.8	5.1-5.2	14.2-15.3	11-11.1
Trinidad	12.7	3.4	3.7	12.8	9.7
Bartica, British Guiana ⁷⁵	11.6-15.3	3.4-3.6	17.7-19.4	13.8-14	9.7-10.6

⁷⁵ This series is topotypic and, agreeing in every respect with the brief original description, may be considered typical.

♂	Length of body	Length of pronotum	Length of tethon	Length of caudal femora	Length of ovipositor
St. Jean, French Guiana,	14	3.3	18.2	14.3	12.7
Brazil. (<i>Type of meridionale</i>), . . .	13.2	3.7	5.1	13.4	12.7 ²³
Tijuca, Brazil, . . .	13.3-15	3.6-3.8	4.4-5.6	13.4-15	11.7-13.1
Perené, Peru, . . .	14	3.3	20.8	13.4	11.7
Contamano, Peru	11.8	3.5	19	13.6	11.6
Contamano, Peru	13-14.7	3.6-3.8	1.9-5.2	13.7-11.3	10.3-11.7
Santa Ana, Peru, 3000 ft.,	12.3	3.3	5.6	12	10.6
Alto Paraná, Paraguay,	14.1	3.7	21	14.6	14.1
Puerto Cantero, Paraguay,	17.4-19.2	3.4-4	20.2-21.7	14.1-14.6	12.7-14.9
Puerto Cantero, Paraguay,	15.2	3.8	7.1	14.6	13.4
Sapuceay, Paraguay	15.7-16.4	3.4-3.8	18.8-21.3	13.4-14.2	13.3-13.8
Sapuceay, Paraguay	14-16.6	3.3-3.8	1.8-5.7	13-13.8	12-13.3
Extreme range of variation,	12.2-19.2	3.2-4	3.3-6.1 16.7-21.7	12-15.9	8.4-14.9

In this species the head and pronotum (excepting for a well defined, but not very dark, brown medio-longitudinal stripe), limbs (excepting that the genicular areas of the caudal femora are often somewhat, but not heavily, suffused with brown), thorax and proximal exposed portion of abdomen, green; dorsum, and in males all of distal portion of abdomen including cerci (which are in some series uniform in color, but in others much suffused with green) tawny with paler lateral stripes weakly indicated in concealed proximal portion. Females have the dorsum of the abdomen usually uniform tawny or brownish, but in some examples the paler lateral stripes appear and are occasionally continued to the base of the ovipositor.

The ventro-cephalic margins of the cephalic femora are armed with 6 and 7 spines in three specimens before us, and with 7 and 7 in one. Three of these are from Long Ditton, Dominica, the

²³ Scudder gives the ovipositor length as 13 mm. Our measurement of this dimension are all taken from the base of the basal plica to the apex of the ovipositor, hence the slight difference.

other from Port of Spain, Trinidad, which specimen has the ventro-cephalic margins of the median femora armed with 7 and 7 spines. In these specimens the extra (proximal) seventh spine is decidedly smaller than any of the others and abnormal in appearance; in *C. angustifrons* this spine is much more like the other six.

The ventro-external margins of the caudal femora are armed in the one hundred and ninety-four perfect specimens before us as follows:

Number of spines,	0-0	0-1	0-2	0-3	0-4	1-1	1-2
Number of specimens,	5	11	9	1	1	15	20
Number of spines,	1-3	1-4	1-5	2-2	2-3	2-4	2-5
Number of specimens,	10	6	1	19	23	12	1
Number of spines,	3-3	3-4	3-5	3-6	4-4	4-5	5-5
Number of specimens,	13	26	5	1	7	6	2

Of the five specimens with these margins unarmed, four are from Trinidad and one from Venezuela. The Paraguayan series average nearer the maximum number than do the others and one specimen bears a single spine on one of the ventro-internal margins as well; otherwise every series exhibits about the same amount of variability.

The genicular lobes of the caudal femora are normally bispinose, in the series before us one of these lobes is unispinose in thirteen specimens, two are so in one specimen, while all are in this condition in one.

Specimens Examined: 276; 114 males, 151 females, 4 immature males and 7 immature females.

Montserrat, West Indies, III, 1, 1894, (H. G. Hubbard), 1 ♂, [U. S. N. M.], (brach.).

Pointe à Pitre, Guadeloupe, West Indies, VI, 6, 1911, (Crampton and Lutz), 2 ♂, 1 ♀, [A. M. N. H.], (brach.).

Roseau, Dominica, West Indies, VI, 8, 1911, (Crampton and Lutz), 1 ♂, [A. M. N. H.], (brach.).

Laudet, Dominica, West Indies, VI, 12, 1911, (Crampton and Lutz), 1 ♂, 1 ♀, [A. M. N. H.], (brach.).

Long Ditton, Dominica, West Indies, VI, 20, 1911, (Crampton and Lutz), 7 ♂, 4 ♀, [A. M. N. H.], (brach.).

Martinique, West Indies, VII, 26, 1905, (A. Busek), 1 ♀, [U. S. N. M.], (brach.).

Saint Lucia, West Indies, XI, 25, 1912, (H. S. Parish), 1 ♀, [A. N. S. P., Maer.).

San Mateo, Costa Rica, I, 1903, 250 meters elevation, (P. Biolley), 1 ♀, (Hebard Cln.), (maer.).

- Río Grande, Costa Rica, III, 6, 1912, (M. Cary), 1 ♀, (Hebard Cln.), (brach.).
- Pózo Azul, Costa Rica, 1 ♀, (Hebard Cln.), (maer.).
- Juan Viñas, Costa Rica, XI, 1906, (Wm. Schaus), 1 ♂, 1 ♀, (U. S. N. M.), (brach.).
- Siquirres, Costa Rica, VII, 3, 1903, (M. A. Carriker Jr.), 2 ♂, (Hebard Cln.), (1 brach.).
- Guatel, Costa Rica, IV, 20 to 22, 1902, (C. F. Underwood), 1 ♂, 2 ♀, (Hebard Cln.), (brach.).
- Philadelphia Banana Ranch, Costa Rica, (F. Knab), 5 ♂, 4 ♀, (U. S. N. M.), (3 ♂, 1 ♀ brach.).
- Ancon, Canal Zone, Panama, XI, 12 and 16, 1913, (Hebard; lush grasses on hillside), 3 ♂, 3 ♀, (Hebard Cln.), (brach.).
- Old Panama, Panama, XI, 13, 1913, (Hebard; grasses near jungle), 3 ♂, 3 ♀, (Hebard Cln.), (brach.).
- Zone limit three miles west of Empire, Panama, XI, 14, 1913, (Hebard; grasses near jungle), 2 ♂, (Hebard Cln.), (brach.).
- Culebra, Canal Zone, Panama, (H. H. Rousseau), 1 ♀, (U. S. N. M.), (maer.; dr. alch.).
- Buenaventura, Colombia, V, 7 and 8, 1914, (H. S. Parish), 2 ♀, (A. N. S. P.), (brach.).
- Cali, Colombia, V, 26, 1914, (H. S. Parish), 1 ♀, (A. N. S. P.), (brach.).
- San Esteban, Venezuela, X to XI, 1910, (M. A. Carriker Jr.), 2 ♂, 2 ♀, 1 juv. ♂, (A. N. S. P.).
- La Guira, Venezuela, (Robinson), 1 ♀, (M. C. Z.), (maer.).
- Río Mato, Venezuela, X and XI, 1909, (M. A. Carriker Jr.), 3 ♂, 6 ♀, (A. N. S. P.), (maer.).
- Las Quiguas, Venezuela, IX, 1910, (M. A. Carriker Jr.), 2 ♂, 2 ♀, 2 juv. ♀, (A. N. S. P.), (adults brach.).
- Cariaquito, Venezuela, I, 18 to 22, 1911, (S. Brown), 1 ♂, 4 ♀, 1 juv. ♂, (A. N. S. P.), (adults brach.).
- La Piedrita, Venezuela, II, 16, 1911, (S. Brown), 2 ♂, 5 ♀, (A. N. S. P.), (brach.).
- Buelta Triste, Venezuela, II, 20, 1911, (S. Brown), 1 ♀, (A. N. S. P.), (brach.).
- Port of Spain, Trinidad, VI, 19 to 20, 1905, (A. Buseck), 5 ♂, 2 ♀, (U. S. N. M.), (2 ♂ maer.).
- Caparo, Trinidad, VIII, 1913, (S. M. Klages), 15 ♂, 28 ♀, (Hebard Cln.), (2 ♂, 5 ♀ brach.).
- Heights of Aripo, Trinidad, VIII, 20 to IX, 21, 1909, (M. A. Carriker Jr.), 4 ♂, 7 ♀, 2 juv. ♂, 1 juv. ♀, (A. N. S. P.), (1 ♂, 2 ♀ maer.).
- Carenage, Trinidad, VIII, 1909, (M. A. Carriker Jr.), 2 ♂, 1 ♀, (A. N. S. P.), (♀ maer.).
- Bartica, British Guiana, XII, 3, 1912, to III, 28, 1913, (H. S. Parish), 11 ♂, 21 ♀ (A. N. S. P.), (1 ♂, brach.); V, 8, 1901, (R. J. Crew), 1 ♂, (A. N. S. P.), (maer.).

Georgetown, British Guiana, VII, 2, 1911, (Crampton and Lutz), 1 ♂, [A. M. N. H.], (maer.).

Rockstone, British Guiana, VII, 8 and 9, 1911, (Crampton and Lutz), 1 ♂, 1 ♀, [A. M. N. H.], (♀ maer.).

Tumatumari, British Guiana, VII, 11, 1911, (Crampton and Lutz), 2 ♂, [A. M. N. H.], (1 maer.).

Paramaribo, Dutch Guiana, (K. Mayo), 4 ♂, 5 ♀, [A. N. S. P.], (2 ♂, 4 ♀ maer.).

St. Jean, Maroni River, French Guiana, VI, (Wm. Schaus), 1 ♀, [U. S. N. M.], (maer.).

Pará, Brazil, (C. F. Baker), 1 ♂, [A. N. S. P.], (maer.).

Igarape-Assu, Pará, Brazil, I, 17, 1912, (H. S. Parish), 1 ♂, [A. S. N. P.], (maer.).

Tijuca, Rio de Janeiro, Brazil, IV, 9 to 11, 1913, (M. Burr), 8 ♂, 5 ♀, 1 juv. ♀, [A. N. S. P. and Oxford Univ. Mus.].

Perené, Peru, III, 1900, 1 ♀, [A. N. S. P.], (maer.).

Chanchemayo, Peru, 1 ♂, [A. N. S. P.], (maer.).

Santa Ana, Eastern Peru, 3000 ft., (Yale Peruvian Exp. 1911), 5 ♂, 1 ♀, 1 juv. ♀, [U. S. N. M.], (adults brach., dr. alch.).

Contamano, Rio Ucayali, Peru, X to XII, 1912, 10 ♂, 3 ♀, 1 juv. ♀, [A. N. S. P.], (3 ♂, 1 ♀ maer., dr. alch.).

Alto Paraná, Paraguay, III, 1914, 1 ♀, [A. N. S. P.], (maer.).

Puerto Cantera, Alto Paraná, Paraguay, XII, 9, 1913, (C. Schrottky), 3 ♀, [A. N. S. P.], (2 maer.).⁷⁷

Sapucay, Paraguay, I, 5-III, 21, 1900 to 1905, (W. T. Foster), 7 ♂, 19 ♀, 1 juv. ♀, [U. S. N. M. and Hebard Cln.], (3 ♂, 9 ♀ maer.).

Conocephalus borelli (Giglio-Tos) (Pl. XXII, figs. 21 and 24.)

1897. *X[iphidium] borellii* Giglio-Tos. Boll. Mus. Zool. Anat. comp. Univ. Torino, xii, no. 302, p. 41. [San Lorenzo and Caiza, Bolivia.]

The present insect is represented in the material before us by but two females, which agree with the original description but are slightly larger than the maximum measurements.

These specimens show, as Giglio-Tos states, that the species is very near *C. saltator* (that author, however, using the synonymous name *X. brachypterum*). When compared with brachypterous but otherwise typical females of *saltator*, we find our specimens, as Giglio-Tos has observed, to be differentiated by the decidedly

⁷⁷ This series has been recorded in part by Caudell, the macropterous individuals correctly, the brachypterous examples as the synonymous *meridionale*, Proc. U. S. Nat. Mus., xxx, p. 242, (1906), and macropterous specimens correctly by Rehn, Proc. Acad. Nat. Sci. Phila., 1907, p. 393, (1907). In following Redtenbacher's Monograph, subsequent authors have almost without exception been led into the error of considering the macropterous and brachypterous conditions of the present insect separate specific units.

broader tegmina with apices truncate and very broadly rounded (very much more so than in any examples of *saltator*), with veins decidedly less distinct and by the much more decidedly curved ovipositor. The males are said to have the distinguishing characters of the tegmina equally pronounced. We find the wings of the females to be distinctly aborted, but not reduced to a filiform condition. We do not consider the incision of the female subgenital plate given by Giglio-Tos to be of any value.

In addition to the characters given above, we would say that in the specimens before us the form is distinctly heavier than even the extreme of this tendency found in *saltator* in Paraguay. The eyes are distinctly larger and more protruding, while the vertex is narrower than is normal in *saltator*, being slightly less than two-thirds the width of the proximal antennal joint, and decidedly deeper, being two and three-fourths times as deep as greatest width, with sides distinctly but weakly convergent, almost straight. The lateral lobes of the pronotum have the cephalic margin broadly rounded to the ventro-caudal angle with the ventro-cephalic angle weakly indicated, the ventro-caudal angle is sharply rounded, the caudal margin straight with the humeral sinus absent, the convex callosity is very narrow. The latero-dorsal pale bands of the abdomen are slightly more distinct than in any specimens of *saltator* before us, while the genicular areas are contrastingly darkened. The ovipositor is not only more decidedly curved than in that species but differs also in shape, narrowing appreciably from the median point to the acute apex, which narrowing begins in *saltator* near the apex as is normal for the great majority of the American species. The specimens before us have the ventro-external margins of the caudal femora armed with 4 and 5 and 5 and 5 spines, which are heavier than normal in the allied species. Their measurements are: length of body 15.5-16.3, pronotum 3.7-4, tegmen 3-3.9, caudal femur 15.4-16, ovipositor 9.7-10.1 and width of tegmen 2.6-2.7 mm.

Specimens Examined: 2; 2 females.

Sapucay, Paraguay, I, 24, to 25 and II, 1901, (W. T. Foster, 2 ♀, U. S. N. M. and Hebard Coll.), (brach.).

Conocephalus truncatus (Reutenbacher) (Pl. XXII, figs. 7, 17 and 22; XXIII, 24 and 25; XXIV, 7).

1901. *Xiphidium truncatum* Reutenbacher, Verh. k.-k. zool.-bot. Gesell. Wien, xli, p. 522. [Brazil.]

In general form, tegminal structure, vertex and male cerci the present insect shows its close affinity to *C. versicolor* and *C. ochrotelus*. In the last two characters it more closely agrees with the former species; the cerci are, however, less elongate with swollen portion overhanging the tooth more decided and distal portion narrowing to a sharper apex. In the tegminal structure close affinity is shown to *ochrotelus*. In coloration and unarmed ventral margins of the caudal femora, it agrees with neither of the above species.

Size medium, form moderately robust. Vertex not strongly but distinctly ascending, narrow, greatest width one-half that of proximal antennal joint, about two and three-fourths times as deep as wide, sides straight and very weakly convergent. Eyes moderately large and decidedly protruding. Antennae greenish with each joint weakly annulate with brown at the suture, not of the extreme length found in *versicolor*. Lateral lobes of pronotum with cephalic margin convex to the sharply rounded ventro-caudal angle, ventro-cephalic angle weakly defined, caudal margin subsinuous, almost straight, humeral sinus absent, convex callosity very narrow. Tegmina of male similar to those of *ochrotelus* but with veinlets distinct and large tympanum considerably more elongate, distinctly longitudinal; wings small and aborted, about half as long as tegmina. Tegmina of female small rounded pads, usually overlapping dorsad; wings small aborted pads of nearly equal length. Male cerci with basal third moderately stout, mesal third distinctly swollen and decidedly produced above a rather long and slender ventral tooth, which is straight to the sharp and decurved apex, the tooth situated proximad of the middle and directed meso-proximad, distal portion of cercus directed weakly outward, distinctly and evenly flattened, with margins converging evenly to the acute apex. Subgenital plate of male truncate between the rather short distolateral styles. Ovipositor short and weakly but distinctly arcuate dorsad. Subgenital plate of female flat with lateral margins strongly and rather broadly curved upward, embracing the base of the ovipositor. Caudal femora with proximal portion

decidedly swollen, genicular lobes bispinose, ventral margins unarmed.

Coloration.—Male: Head excepting eyes and dorsal surface, lateral lobes of pronotum, body and exposed proximal portion of abdomen, cephalic and median limbs and greater part of swollen portion of caudal femora light oriental green, caudal margin of pronotum, tegmina, abdomen and cerci uniform cinnamon. Remaining portions of caudal limbs greenish washed with cinnamon, excepting the genicular lobes which are briefly suffused with chestnut. Medio-dorsal stripe of head and pronotum very broad, shining blackish brown, with pale margins buffy and wider than is usual. Eyes chestnut brown. In the female the coloration is similar, excepting that the abdomen shows traces of darker longitudinal stripes on the dorsum and sides, in one specimen before us these stripes being pronounced, those on the sides darkest, chestnut brown. The coloration of part of the series is apparently well preserved.

Measurements (in millimeters) of extremes

	Length of body	Length of pronotum	Length of tegmen	Length of caudal femur	Length of ovipositor
Petropolis, Brazil.					
♂	10.5-13	3.1-3.3	5.2-5.8	10.8-12	
♀	12-14	3.2-3.3	2.6-2.6	11.7-12.3	8-8.9

Specimens Examined: 17; 6 males and 11 females.

Petropolis, Rio de Janeiro, Brazil, IV, 12 to 14, 1913, (M. Burr), 6 ♂, 10 ♀, [A. N. S. P. and Oxford Univ. Chn.].

Tijuca, Rio de Janeiro, Brazil, IV, 9 to 11, 1913, (M. Burr), 1 ♀, [A. N. S. P.].

Conocephalus versicolor (Redtenbacher) (Pl. XXII, figs. 8 and 18; XXIII-26 and 27; XXIV, S.)

1891. *Xiphidium versicolor* Redtenbacher, Verh. k.-k. zool.-bot. Gesell. Wien, xli, p. 507. [Fonteboa, Brazil.] [Macropterous ♂].

1898. *X[iphidium] festae* Giglio-Tos, Boll. Mus. Zool. Anat. comp. Univ. Torino, xiii, no. 311, p. 92. [San José, Guayaquiza and Valleys of Santiago and Zamora, Ecuador.] [Brachypterous series].

With the present knowledge of the genus it is perfectly evident that *festae* is an absolute synonym of the present species, based on brachypterous material; from three of the four localities given

for *festae*, Giglio-Tos records *versicolor* as well and suggests the possibility of *festae* being but a variety of that species.

The present species is a member of the distinctive South American group H of the subgenus *Xiphidion*, remarkable for the brilliant and very distinctive coloration of the species.

The male sex of the species is very striking, the green cephalic and median limbs, wings and cerci contrasting brilliantly with the yellow head, lateral lobes of the pronotum, caudal femora (excepting the dark genicular areas) and abdomen, which latter furthermore has the dorsal abdominal segments strikingly marked as follows: the proximal five are shining black dorsad and laterad, the sixth and seventh maculate with black meso-dorsad, while the greater part of the eighth and all of the ninth and tenth are shining black. The female has the abdomen similarly but much less strongly darkened.

Size rather large, form graceful with limbs decidedly elongate. Vertex not strongly but distinctly ascending, narrow, greatest width one-half that of proximal antennal joint, slightly over two and three-fourths times as deep as wide, sides straight and very weakly convergent. Eyes moderately large and decidedly protruding. Antennae greenish with each joint annulate at the suture with brown, in material before us 62 mm. in length. Lateral lobes with cephalic margin convex to the sharply rounded ventro-caudal angle, ventro-cephalic angle broadly rounded but evident, caudal margin subsinuuous, almost straight, humeral sinus absent, convex callosity very narrow. Tegmina, in macrop-terous and brachypterous material, with apex sharply rounded; male tympanum very small and distinctly though not strongly longitudinal. Male cerci moderately elongate (2 to 2.2 mm. in material before us), very slightly but noticeably irregular in outline, basal third moderately stout, mesal third distinctly and evenly swollen, this swelling more decided, however, above a rather long and rather slender ventral tooth which is straight to the sharp decurved apex, the tooth situated proximad of the middle and directed strongly meso-proximad, distal portion curved weakly outward, distinctly but regularly flattened, particularly on the inner side, with margins very weakly irregular but converging evenly to the rather sharply rounded apex. The cercus has the same appearance found in the North American *C. nigro-pleuroides*, suggesting minor irregularities more strongly than do

the normal hard and rigid appearing cerci of the other species of the genus. Subgenital plate truncate between the short distolateral styles. Ovipositor elongate (in the specimen before us 13 mm.), nearly straight. The caudal femora are elongate (σ , 13.7-15.7; ? , 16.2 in the material before us) and armed with (σ , 3 and 4 and 4 and 5; ? , 4 and 5, in our material) long, heavy spines.

Specimens Examined: 3; 2 males and 1 female.

Caparo, Trinidad, VIII, 1913, (S. M. Klages), 2 σ , [Hebard Coll., Brazil.

Contamana, Rio Ucayali, Peru, X to XII, 1912, 1 ? , [A. N. S. P., (maer., dr. aleh.).

Conocephalus ochrotelus⁷⁸ new species (Pl. XXI, fig. 7; XXII, 9; XXIII, 28 and 29; XXIV, 9.)

Apparently nearest in relationship to *C. truncatus*⁷⁹ and allied to *C. versicolor*, but distinctive in coloration and several other important characters given below.

Type: σ , Itatiba, São Paulo, Brazil. April 10. (J. Lima.) [Academy of Natural Sciences Philadelphia, Type No. 5268.]

Description of Type.—Size medium, form moderately robust. Coloration very distinctive. Head with dorsum of vertex when seen from lateral aspect scarcely ascending (not as much as in *versicolor*), fastigium of vertex narrow, but about two-thirds as wide as basal antennal joint, two and one-fourth times as long as broad, sides straight and not decidedly convergent. Eyes moderately large, moderately protruding (not as much so as in *versicolor*). Lateral lobes of pronotum with cephalic margin convex to the ventro-caudal angle, ventro-cephalic angle very broadly rounded but distinct, ventro-caudal angle sharply rounded and rectangular, humeral sinus absent, convex callosity very narrow. Tegmina broad and truncate with very broadly rounded apex, covering half the distance from the pronotum to the apices of the cerci, veins distinct, veinlets subobsolete, tympanum large and distinctly though not strongly longitudinal (somewhat more nearly transverse than in *versicolor*); wings small aborted pads broadly rounded at apex, extending half the distance from the tegminal speculum to the apices of the tegmina. Cerci heavy and elongate, proximal portion stout and very brief, mesal portion very elongate and much swollen, produced weakly interno-proximad in a rounded narrow shelf, in the mesal portion of which is situated ventrad a rather heavy tooth directed strongly meso-proximad with its sharp apex weakly decurved, distal portion of shaft broad and rather elongate, decidedly depressed, sides subparallel to apical portion, where they become evenly convexo-convergent to the very

⁷⁸ From $\delta\chi\rho\sigma$ =pale and $\tau\acute{\epsilon}\lambda\omicron\varsigma$ =end, in allusion to the pale and strongly contrasting coloration of the two distal dorsal abdominal segments.

⁷⁹ See page 280 for comparison with this species.

sharply rounded apex, giving the contour of a very narrow Gothic arch. Subgenital plate short, truncate distad between the short disto-lateral styles. Cephalic and median limbs very slightly shorter and heavier than in *versicolor*, with ventral margins of tibiae each likewise armed with six heavy spines (slightly heavier than in *versicolor*). Caudal femora proportionately shorter than in *versicolor* with proximal decidedly swollen portion similar, ventro-external margins bearing 5 and 8 spines, genicular lobes of caudal femora heavily bispinose, genicular areas weakly darkened.

The measurements of the type are: length of body 13.5, pronotum 3.6, tegmina 4.9 and 5.2, caudal femur 13.4, cercus 2.3 and approximate width of tegmen if flattened out 3.3 mm.

The coloration is distinctive. Head, lateral lobes of pronotum, thorax, limbs, exposed lateral portions of dorsal abdominal segments and cerci pale bice green. Medio-dorsal stripe of head and pronotum warm sepia shading mesad on pronotum to verona brown, rather broadly margined laterad with cinnamon buff. Eyes and tegmina cinnamon, humeral trunk of tegmina cinnamon buff. Concealed proximal portion of dorsum of abdomen tawny olive paler mesad (cinnamon buff) and showing rather broad lines of the same color meso-laterad. Exposed portion of dorsum of abdomen with sixth segment weakly, and seventh and eighth heavily and broadly suffused with sepia, the margins of these segments marked with a greenish suffusion, ninth and tenth segments, subgenital plate and ventral abdominal segments pinkish cinnamon contrasting strongly with the proximal dorsal abdominal segments and cerci, tenth abdominal segment with distal margin strongly suffused with warm sepia. Genicular areas of caudal femora suffused (but not strikingly so) with bistre.

The present species is known from the unique type.

Subgenus **Perissacanthus**⁸⁰ new subgenus

The subgenus includes a single species from Paraguay.

Type of Subgenus.—*Conocephalus strictoides* [*Xiphidium strictoides*] (Caudell).

Subgeneric Description.—Prosternum bispinose. Male subgenital plate as in the subgenus *Xiphidium*. Ventral margins of cephalic and median tibiae armed with six well spaced spines. Interno-dorsal of distal spurs of caudal tibiae absent so that their

⁸⁰ From *περισσός*=odd (number) and *ἀκανθα*=thorn, in allusion to the five instead of six distal spurs of the caudal tibiae.

number is five, instead of six as found in the great majority of the species of the genus. Size medium for the genus, form very attenuate.

Conocephalus strictoides (Caudell) (Pl. XXI, figs. 2 and 5; XXII, 10 and 19; XXIII, 30 and 31.)

1906. *Xiphidium meridionale* Caudell (not of Scudder, 1875). Proc. U. S. Nat. Mus., xxx, p. 242. (In part.) [Sapucay, Paraguay.] [2 ♀.]

1906. *Xiphidium strictoides* Caudell, Proc. U. S. Nat. Mus., xxx, p. 242. [Sapucay, Paraguay.] [3 ♀, 1 juv. ♀.]

This distinctive species shows a slight amount of similarity to the North American *C. spartinae* in the general form of the male cercus; the ovipositor is decidedly longer than in any other American species excepting *C. strictus* and *C. leptopterus*, all of which species differing greatly in most important respects.

Caudell unfortunately included males before him with a series of brachypterous *C. saltator*, recording them as *meridionale*, a synonym of *saltator*. We consequently here select and describe the allotype.

Allotype: ♂; Sapucay, Paraguay. January 29, 1901. (W. T. Foster.) [United States National Museum.]

Description of Allotype.—Very similar to type excepting in sex characters. Size medium, form very slender. Head with vertex strongly produced, when seen from lateral aspect not ascending above plane of occiput; fastigium of vertex narrow, greatest width very slightly more than one-half that of proximal antennal joint, narrowing strongly to point two-thirds of the distance from apex to facial suture, thence subparallel to latter, two and one-half times as long as broad. Eyes rather small for the South American species of the genus (about as in *C. brevipennis* and *C. spartinae*) and also not strongly protruding. Lateral lobes of pronotum with cephalic margin very broadly and evenly convex and unusually oblique to the rather sharply rounded ventro-caudal angle which is rectangulate, caudal margin almost straight but with a subobsolete convexity at convex callosity, humeral sinus absent, convex callosity moderately broad. Tegmina rather narrow, reaching two-thirds of the distance to the apex of abdomen with apices truncate and broadly rounded, veins distinct but very delicate, veinlets exceedingly delicate, tympanum very small and distinctly longitudinal (slightly more so than in *C. versicolor*), with stridulating vein decidedly swollen for two-thirds of its length; wings about four-fifths as long as tegmina with broadly rounded apices showing a tendency toward an aborted condition. Cerci rather slender and elongate, brief proximal portion rather stout, very elongate mesal portion decidedly and evenly swollen except above the proximo-ventral rather slender tooth, which it overhangs in a squared projection with immediate angle rounded, the tooth

directed strongly meso-proximad with sharp apex weakly decurved, internal margin of swollen portion straight, external margin of cercus concave, distal portion strongly depressed and directed outward with margins converging to the rather broadly rounded apex. Subgenital plate with distal margin very weakly concave between the comparatively long disto-lateral styles. Ventral margins of the caudal femora unarmed, genicular areas not darkened, genicular lobes normally bispinose; tarsi, comparatively, rather short.

Females rather similar excepting for sex characters but slightly more slender, with caudal margins of lateral lobes of pronotum straight. Tegmina not as long as pronotum, much shorter than in male, rather broadly rounded at apex; wings reaching to tips of tegmina, rather broadly rounded at apices and distinctly aborted. Ovipositor very long and slender and very weakly curved, approximately straight. Subgenital plate shield-shaped, mainly flat, briefly curving upward laterad and embracing base of ovipositor, brief distal margin of flat surface transverse.

Measurements (in millimeters)

	Length of body	Length of pronotum	Length of tegmen	Width of tegminal	Length of caudal femur	Length of cercus	Length of style	Length of ovipositor
Sapucay, Paraguay.								
<i>Allotype</i> , ♂	16	3.2	7.9	2.8	12.6	2.2	.6	.....
♂	16	3.1	7.6	2.8	12.9	2.2	.7	.....
♀	15.5	3.3	3.2	...	13.3	...	...	21.1

The type series and males in the United States National Museum examined by us, and an additional female taken by the same collector at the same locality and in the Hebard Collection, these specimens taken from December to April 1900-1902, two males, four females and one immature female, are the only specimens known of this interesting species.

Subgenus **Aphauropus**⁸² new subgenus

The subgenus includes a single species from Tepic, Mexico.

Type of Subgenus.—*Conocephalus leptopterus* new species.

Subgeneric Description.—Prosternum bispinose. Subgenital plate of male unknown. Ventral margins of cephalic and median tibiae armed with seven or eight well spaced spines. Caudal tibiae with dorsal and ventral pairs of distal spurs absent, armed at the distal extremities with a single (well-developed) pair of median spurs as in the subgenus *Anarthropus*. Tegmina of female greatly aborted, wings missing. Size medium for the genus, form robust.

⁸¹ Approximately, if flattened out.

⁸² From ἀφαιρός=weak and ποῦς=foot, in allusion to absence of the normal dorsal and ventral pairs of distal spurs of the caudal tibiae.

Conocephalus leptopterus⁸³ new species (Pl. XXI, figs. 1 and 4; XXII, 11.)

This distinctive species would suggest *C. strictus* in the robust form, unarmed ventral margins of the caudal femora, unispinose genicular lobes and very long ovipositor, but when examined is found to be widely separated from any known form of the genus. The insect agrees with *C. saltans* in having the caudal tibiae armed distad with but a single pair of spurs, but in the present insect the prosternum is bispinose and the cephalic and median tibiae have their margins armed with seven or eight instead of six spines. In a number of characters the insect is unique.

Type: ♀; Tepic, Tepic, Mexico. [Hebard Collection, Type No. 385.]

Description of Type.—Size medium, form robust. Dark medio-dorsal band of head and pronotum continued solid and uninterrupted on abdomen to base of ovipositor. Head with vertex, when seen from lateral aspect, in same horizontal plane as occiput, fastigium of vertex narrow but about two-thirds as wide as proximal antennal joint, nearly two and one-half times as deep as broad, narrowing evenly three-fourths of the distance from apex to facial suture, then subparallel, this whole outline almost imperceptibly concave. Eyes medium for the genus (small for so robust an insect), not strongly protruding. Pronotum unusually long and of exceptional shape, lateral lobes broadly rounded to the ventro-caudal angle which is distinctly obtuse-angulate, caudal margin straight, very weakly subsinuate, humeral sinus absent, convex callosity exceedingly broad, swollen and conspicuous; the cephalic and caudal margins are strongly oblique to the ventro-caudal angle, which is almost mesal in position. Tegmina greatly aborted, small rounded pads wholly concealed by pronotum; wings absent. Ovipositor very long and slender showing a very weak upward curvature, approximately straight. Subgenital plate broadly shield-shaped, mainly flat, briefly curved upward laterad and embracing the base of the ovipositor, distal rather broad margin of flat surface transverse.

The measurements of the type are: length of body 13.5, pronotum 4.2, caudal femur 13.9, ovipositor 30.1 mm.

The type is unique, a dried alcoholic individual.

⁸³ From λεπτός=minute and πτερόν=wing, in allusion to the minute, aborted and wholly concealed tegmina found in the female sex of this extraordinary species.

EXPLANATION OF PLATES.

Plate XXI

- Fig. 1.—*Conocephalus leptopterus* new species. Tepic, Mexico. Female (*type*). Lateral outline. ($\times 3$)
- Fig. 2.—*Conocephalus strictoides* (Caudell). Sapucay, Paraguay. Male (*allotype*). Lateral outline of vertex. ($\times 25$)
- Fig. 3.—*Conocephalus unicolor* (Bruner). Corumbá, Brazil. Female (*topotype*). Lateral outline. ($\times 3$)
- Fig. 4.—*Conocephalus leptopterus* new species. Tepic, Mexico. Female (*type*). Distal extremity of caudal tibia, internal aspect. ($\times 20$)
- Fig. 5.—*Conocephalus strictoides* (Caudell). Sapucay, Paraguay. Male (*allotype*). Distal extremity of caudal tibia, internal aspect. ($\times 20$)
- Fig. 6.—*Conocephalus iriodes* new species. Kaitour, British Guiana. Male (*type*). Lateral outline. ($\times 3$)
- Fig. 7.—*Conocephalus ochrotelus* new species. Itatiba, Brazil. Male (*type*). Lateral outline ($\times 3$)

Plate XXII

Outline of cephalic view of fastigium. ($\times 25$)

- Fig. 1.—*Conocephalus longipes* (Redtenbacher). Carcaraña, Argentina. Male.
- Fig. 2.—*Conocephalus vitticollis* (Blanchard). El Olivar, Colchagua, Chile. Male.
- Fig. 3.—*Conocephalus ictus* (Scudder). Otoyac, Mexico. Male.
- Fig. 4.—*Conocephalus insularis* (Morse). Pinar del Rio, Cuba. Male.
- Fig. 5.—*Conocephalus iriodes* new species. Kaitour, British Guiana. Male (*type*).
- Fig. 6.—*Conocephalus angustifrons* (Redtenbacher). Juan Viñas, Costa Rica. Male.
- Fig. 7.—*Conocephalus truncatus* (Redtenbacher). Petropolis, Brazil. Male.
- Fig. 8.—*Conocephalus versicolor* (Redtenbacher). Caparo, Trinidad. Male.
- Fig. 9.—*Conocephalus ochrotelus* new species. Itatiba, Brazil. Male (*type*).
- Fig. 10.—*Conocephalus strictoides* (Caudell). Sapucay, Paraguay. Male (*allotype*).
- Fig. 11.—*Conocephalus leptopterus* new species. Tepic, Mexico. Female (*type*).
- Outline of lateral lobe of pronotum. ($\times 6$)
- Fig. 12.—*Conocephalus cincrus* (Thunberg). Kingston, Jamaica. Male (*topotype*).
- Fig. 13.—*Conocephalus ictus* (Scudder). Santa Rosa, Mexico. Atypical male.
- Fig. 14.—*Conocephalus insularis* (Morse). Pinar del Rio, Cuba. Male.
- Fig. 15.—*Conocephalus angustifrons* (Redtenbacher). Juan Viñas, Costa Rica. Male.
- Fig. 16.—*Conocephalus saltator* (Saussure). Paramaribo, Dutch Guiana. Male (*topotype*).

- Fig. 17.—*Conocephalus truncatus* (Redtenbacher). Petropolis, Brazil. Male.
 Fig. 18.—*Conocephalus versicolor* (Redtenbacher). Caparo, Trinidad. Male.
 Fig. 19.—*Conocephalus strictoides* (Caudell). Sapucay, Paraguay. Male
 (allotype).
 Fig. 20.—*Conocephalus ictus* (Seudder). Otoyac, Mexico. Male.
 Outline of female tegmen. ($\times 3$)
 Fig. 21.—*Conocephalus borelli* (Giglio-Tos). Sapucay, Paraguay.
 Fig. 22.—*Conocephalus truncatus* (Redtenbacher). Petropolis, Brazil.
 Outline of ovipositor. ($\times 2$)
 Fig. 23.—*Conocephalus iriodes* new species. Kaitour, British Guiana. (Allotype.)
 Fig. 24.—*Conocephalus borelli* (Giglio-Tos). Sapucay, Paraguay.

Plate XXIII

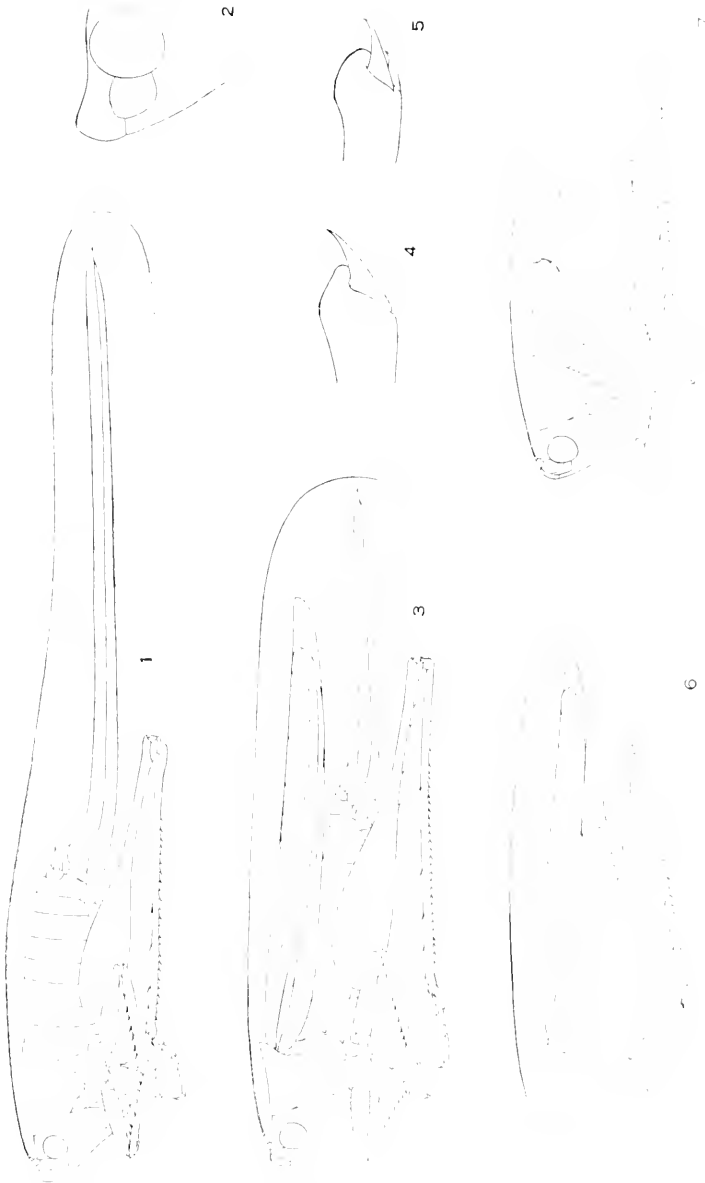
Dorsal (first number) and lateral (second number) outlines of male
 cercus. ($\times 10$)

- Figs. 1 and 2.—*Conocephalus longipes* (Redtenbacher). Carcaraña, Argentina.
 Figs. 3 and 4.—*Conocephalus vitticollis* (Blanchard). El Olivar, Colchagua,
 Chile.
 Figs. 5 and 6.—*Conocephalus cinereus* (Thunberg). Kingston, Jamaica.
 (Topotype.)
 Fig. 7.—*Conocephalus ictus* (Seudder). Santa Rosa, Mexico. Atypical.
 Figs. 8 and 9.—*Conocephalus ictus* (Seudder). Otoyac, Mexico.
 Figs. 10 and 11.—*Conocephalus insularis* (Morse). Pinar del Rio, Cuba.
 Figs. 12 and 13.—*Conocephalus iriodes* new species. Kaitour, British Guiana.
 (Type.)
 Figs. 14 and 15.—*Conocephalus angustifrons* (Redtenbacher). Juan Viñas,
 Costa Rica.
 Figs. 16 and 17.—*Conocephalus equatorialis* (Giglio-Tos). Bartica, British
 Guiana.
 Figs. 18 and 19.—*Conocephalus saltator* (Saussure). Caparo, Trinidad. More
 elongate condition.
 Figs. 20 and 21.—*Conocephalus saltator* (Saussure). Paramaribo, Dutch
 Guiana. (Topotype.) Normal condition.
 Figs. 22 and 23.—*Conocephalus saltator* (Saussure). Tijuca, Brazil. More
 robust condition.
 Figs. 24 and 25.—*Conocephalus truncatus* (Redtenbacher). Petropolis, Brazil.
 Figs. 26 and 27.—*Conocephalus versicolor* (Redtenbacher). Caparo, Trinidad.
 Figs. 28 and 29.—*Conocephalus ochrotelus* new species. Itatiba, Brazil.
 (Type.)
 Figs. 30 and 31.—*Conocephalus strictoides* (Caudell). Sapucay, Paraguay.
 (Type.)
 Outline of male subgenital plate. ($\times 5\frac{1}{2}$)
 Figs. 32 and 33.—*Conocephalus longipes* (Redtenbacher). Carcaraña, Argenti-
 na.

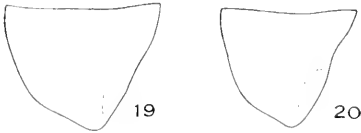
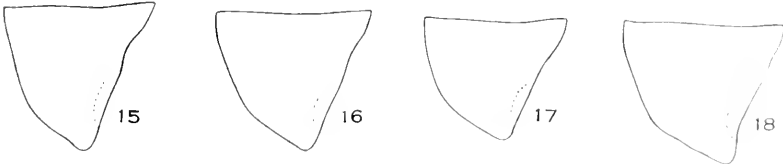
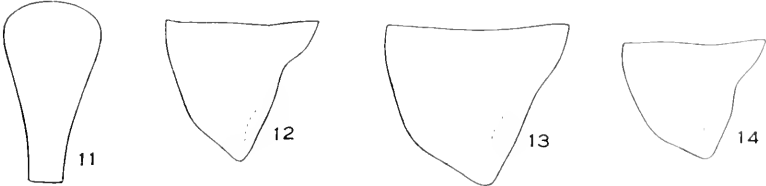
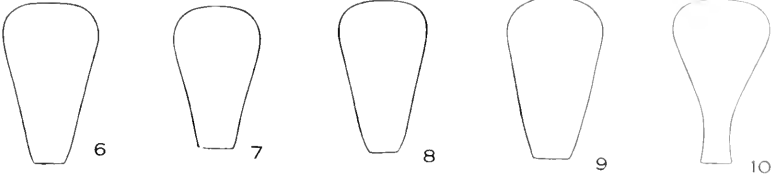
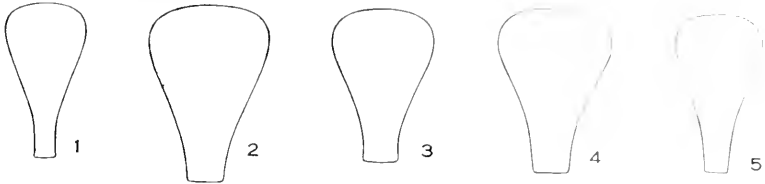
Plate XXIV

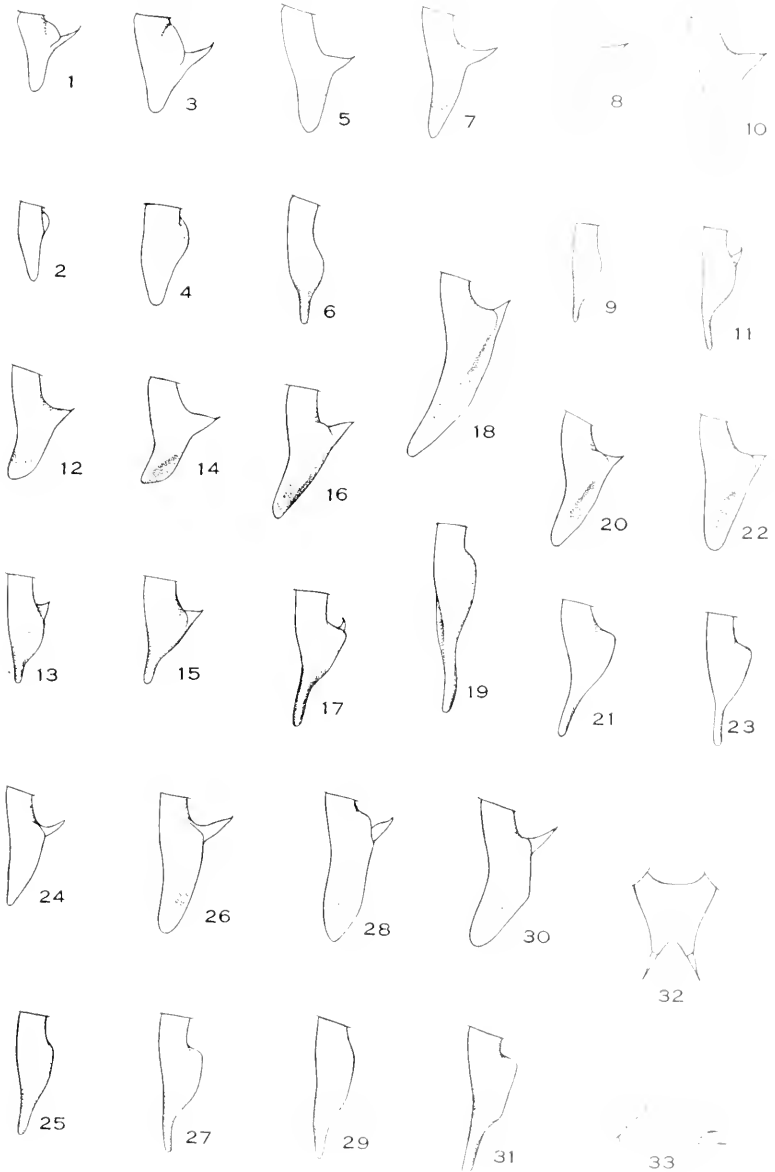
Stridulating field of male tegmen. ($\times 10$)

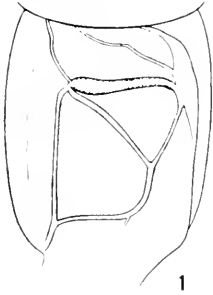
- Fig. 1.—*Conocephalus longipes* (Redtenbacher). Carcaraña, Argentina.
Fig. 2.—*Conocephalus vitticollis* (Blanchard). El Olivar, Colehagua, Chile.
Fig. 3.—*Conocephalus ictus* (Seudder). Otoyac, Mexico.
Fig. 4.—*Conocephalus insularis* (Morse). Pinar del Río, Cuba.
Fig. 5.—*Conocephalus iriodes* new species. Kaitour, British Guiana. (*Type.*)
Fig. 6.—*Conocephalus angustifrons* (Redtenbacher). Juan Viñas, Costa Rica.
Fig. 7.—*Conocephalus truncatus* (Redtenbacher). Petropolis, Brazil.
Fig. 8.—*Conocephalus versicolor* (Redtenbacher). Caparo, Trinidad.
Fig. 9.—*Conocephalus ochrotelus* new species. Itatiba, Brazil. (*Type.*)



REHN AND HEBARD AMERICAN TETTIGONIIDAE.



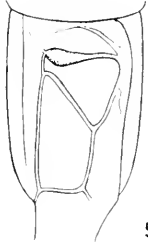




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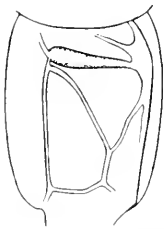
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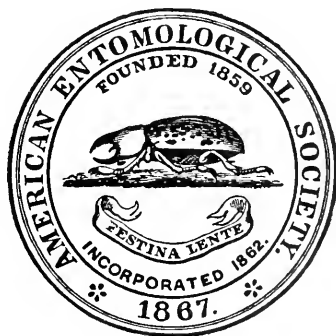
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PHILADELPHIA

SUBSCRIPTION PRICE FOUR DOLLARS PER VOLUME



A REVISION OF THE NORTH AMERICAN SPECIES OF
PACHYBRACHYS

BY H. C. FALL

For reasons, which to the initiated are obvious and sufficient, no really serious attempt at a comprehensive treatment of our species of *Pachybrachys* has been made since the appearance of Suffrian's paper on the North American Cryptocephalini. In 1880, Dr. LeConte essayed to give a table for the separation of the more easily defined species, but in addition to the twenty-nine thus treated, he was compelled to append a list of at least twenty forms which were too indefinite or too little known to permit of tabulation.

Briefly stated, the natural conditions which have discouraged any attempt at a systematic treatment of our species of this genus are,—the great number of species involved; their indefiniteness, due to the lack of salient diagnostic characters, and the great individual variability, more especially in the superficial characters of sculpture and markings, upon which specific distinctions have been largely based. In addition to these inherent difficulties, a further serious obstacle to progress has been the impossibility of recognizing—in the absence of types—a considerable number of the Suffrian species, the descriptions of which, though lengthy, are of little use for purposes of identification. This last obstacle has been in part overcome by the opportunity of examining a number of the Suffrian types kindly sent to Mr. Bowditch and to the writer by Dr. Taschenberg of Halle, through the intercession of Dr. Walther Horn of Berlin. The natural difficulties are of course still with us, and their complete solution is purely a question of time and experience—and will certainly require a large measure of both. The writer realizes—probably more fully than any one else—the shortcomings and incompleteness of the present revision, but to wait the solution of all questions of relationship and synonymy would simply mean that the results of an already protracted study would never be published. It is, moreover, undoubtedly true that the interest of students and

collectors will be stimulated and the ends aimed at be more speedily attained by placing before them the results so far as reached.

The present investigation has been spread over some six or eight years and has been prosecuted more or less continually during the last three or four. There have been, however, during this time many longer or shorter interruptions of active work, and because of this, a certain irregularity, or lack of uniformity of treatment may be noticeable to the critical reader, but it is hoped that the usefulness of the work has not suffered in consequence.

Owing to the great difficulty experienced in identifying many of the species of Suffrian and Jacoby from the descriptions, and inability to obtain authentic examples for study, it is not unlikely that a few of the forms here described as new may prove to be identical with, or merely variations of, certain Mexican species; it is, however, thought best to risk this small amount of synonymy in the interest of completeness of treatment of the material at hand. After making all possible assignments, there remains of course the inevitable residue of unplaceable specimens. There are some fifty or sixty of these—less than one per cent of the total number studied—nearly all of them females, and many unique. Among them are unquestionably a number of undescribed species, but we must await further examples, especially males, before they can be properly characterized.

According to Bowditch, *eburifer* Suffr. occurs at Brownsville, Texas, and he has doubtfully recognized *rubronotatus* Jac. from Iowa and Illinois. The doubt in the latter case I believe to be well founded, and as *eburifer* was described from South America there is more than a chance that there is some mistake in the identification; at all events, I have not sufficient information to permit my including either of these doubtful things in my tables.

Acknowledgments

As usual I have found my entomological friends and correspondents generous in contributing material for study, and it is a pleasure to here acknowledge this assistance. No less than seven thousand specimens have been examined, among them almost the entire material of the National Museum Collection.

for which I am indebted to the unfailing courtesy of Dr. Howard and Messrs. Schwarz and Barber; that of the American Entomological Society of Philadelphia, including the Horn Collection, through the kindness of Dr. Skinner; and also that of the Snow Collection in the University of Kansas. From private collections I have received substantial aid—in most cases their entire material—from Messrs. Leng and Beyer of New York, Mr. Schaeffer of Brooklyn, Messrs. Liebeck and the Wenzels of Philadelphia, Professor Wickham of Iowa City, Mr. Warren Knaus of McPherson, Kansas, Mr. Chas. Dury of Cincinnati, Mr. C. A. Frost of South Framingham, Mass., Mr. Löding of Mobile, Mr. A. B. Wolcott of Chicago, Dr. Blaisdell and Dr. Van Dyke of San Francisco, and Dr. Fenyès of Pasadena, Cal. I have also gone over carefully the collection of the late Frederick Blanchard of Tyngsboro, Mass.; have several times—thanks to Mr. Henshaw's courtesy—examined the LeConte types at Cambridge, Mass., and am indebted to Mr. Bowditch not only for the privilege of studying many of the types of his lately described species, but also for the opportunity of taking a look at a number of the Suffrian types sent to him by Dr. Taschenberg of Halle. Since then I have myself received from Dr. Taschenberg, through the kind offices of Dr. Walther Horn of Berlin, several Suffrian types, which have enabled me to fix the identity of a number of species not hitherto known or properly interpreted by American students. Quite recently, in response to a request to the British Museum, kindly seconded by Mr. Champion, Mr. C. J. Gahan has sent me for study representatives of about a dozen Mexican species, including several of Jacoby's and a number of Suffrian's as determined by Jacoby. The consideration so kindly shown by Mr. Gahan and the Museum authorities is especially appreciated, coming as it does at a time when the working force of the Museum is much reduced, and the hazards of transportation considerably enhanced by the existing European war. Finally I am under especial obligation to Mr. Schwarz of the National Museum and my neighbor, Dr. Fenyès, for bibliographical notes or the loan of some of the older papers not in my own library.

Origin of the genus Pachybrachys

A glance at the literature of the subject shows that there exists a considerable difference of opinion as to whom the genus *Pachybrachys* should be accredited. American students, following without question the lead of Dr. LeConte, seem to have been unanimous in writing *Pachybrachys* Chevrolat. Jacoby, in the *Biologia*, gives Suffrian as authority but adds Chevrolat's name in brackets. In the next to the last edition of the European Catalog by Heyden, Reitter and Weise, it is written *Pachybrachys* Suffrian, while the last edition puts it *Pachybrachis* Redtenbacher. The facts seem to be as follows:

1834. The name *Pachybrachis* Chevr. first appears in Dejean's Catalog. No description of the genus is given, but the species included leave no doubt as to its significance.
1836. In the reprint of the third edition of the Dejean Catalog, numerous species of *Pachybrachis* Chevr. are listed, including a number of North American species described by the older authors (Fabricius, Olivier, etc.).
1837. In the fourth edition of Dejean's Catalog, the species of *Pachybrachis* Chevr. are given verbatim as in the preceding edition without additions.
1847. Dr. E. Suffrian, in a Revision of the European species of the genus *Cryptocephalus* (Linnæa Entom., Vol. II), contends that Chevrolat's division of the genus into five so-called genera, are mere names, but incidentally changes the spelling of *Pachybrachis* to *Pachybrachys* for philological reasons.
1848. Dr. E. Suffrian, in concluding the Revision of the European species of *Cryptocephalus* (Linn. Ent. Vol. III), gives on pp. 111-113 a lengthy description of "*Pachybrachys* Chevrolat," without any reference to Dejean's Catalog.
1849. L. Redtenbacher (*Fauna Austriaca*, 1st Edition, p. 563) describes the genus "*Pachybrachys* Chevrolat."
In the 2d edition of *Fauna Austriaca*, Redtenbacher uses *Pachybrachys* in the text, and *Pachybrachis* in the index.
In the 3d Edition, with fine impartiality, the genus appears as *Pachybrachys* in the table of species, but *Pachybrachis* in the table of genera.

As there is obviously no doubt as to what Chevrolat's name was intended to cover, I shall cite him as authority for the genus, and I shall spell the name correctly.¹ This seems to me the common sense of the matter, and the conclusion is to me all the more satisfactory since it coincides with the views of Dr. LeConte, and requires no deviation from American custom.

Chronology

Chronologically our species have been described as follows:

1798. Fabricius—Suppl. Ent. Syst., p. 109. Here appears *luridus*, the first of our species to receive a name. A common species, known to all collectors.
1801. Fabricius—Syst. Eleuth., II, p. 49—makes known *viduatus* from "Carolina" in a very brief description of ten words. The species is confined to the Southeastern states and is not overly common in collections. Until recently the name *viduatus* has been commonly and erroneously applied to the *bivittatus* of Say.
1808. Olivier—Entomologic. VI, p. 810, 820—describes *femoratus* and *pubescens*. The former is one of the numerous mottled species, and the description is insufficient for positive identification. I have followed LeConte's interpretation, which I believe to be correct. *Pubescens* is a well known species which has been more often alluded to under Haldeman's name *morosa*.
1824. Say—Jour. Acad. Nat. Sci. Phila., III, pp. 436-440—describes *abdominalis*, *bivittatus*, *nigricornis* and *femoratus*. The last named is a synonym of *luridus* Fab. *Bivittatus* is a well known species which has passed as *viduatus* Fab. LeConte seems to have properly identified *abdominalis*, but both this and *nigricornis* have remained unknown to most American entomologists.
1824. LeConte (Major)—Ann. Lye. Nat. Hist. N. Y., I, p. 173—describes *subfasciatus*. A well known species.
1824. Germar—Ins. Sp., p. 560—describes *picturatus*. Our interpretation of this species is not entirely certain: it is of rare occurrence.

¹[It is the author's wish that the emended form of the generic name be used, but it is done contrary to the judgment and practice of the Publication Committee of the Society. Ed.]

1825. Say—Amer. Ent., II, Pl. 28—*othonus*; common, and familiar to all collectors.
1838. Randall—Boston Jour. Nat. Hist., II, p. 46—describes *marginaticollis*. A synonym of *othonus* Say.
1840. Newman—Mag. Nat. Hist., IV, p. 250—describes *limbatus*. This name is preoccupied by Ménétriés (1836) for a species from Asia Minor; *discoideus* Bowditch (1909) replaces it.
1841. Newman—Entomologist, p. 78—describes *sparsus* which has been declared to be the same as *femoratus* Oliv.
1843. Mannerheim—Bull. Mosc., II, p. 311—describes *signatifrons*. The first species from the Pacific coast to receive a name.
1847. Melsheimer—Proc. Acad. Nat. Sci. Phila., III, pp. 170–172—describes in the following order—*m-nigrum*, *atomarius*, *trinotatus*, *aesculi*, *pectoralis*, *hepaticus*, *tridens*, *flavicornis*. Of these, *aesculi* and *flavicornis* are slight varieties of *luridus* and *tridens* respectively. The others are all more or less common in the North Atlantic Coast region, though *atomarius* and *pectoralis* are usually wrongly identified in collections.
1849. Haldeman—Jour. Acad. Nat. Sci. Phila., 2d Series, I, pp. 257–263—describes *punctatus* (= *hepaticus* Melsh.), *morosus* (= *pubescens* Oliv.), *carbonarius*, *infaustus* (= *atomarius* Melsh.), *sobrinus* and *mollis* (= *tridens* Melsh.).
1853. Suffrian—Linn. Ent., VII—describes a large number of species from the United States, Mexico and the West Indies. Many of these have remained unknown to American students, but the recent loan to Mr. Bowditch and myself of certain types from the Suffrian collection has enabled us to clear up much of this uncertainty. I give below in the order of their description the species occurring (so far as known) in our fauna, with some notes as to our present knowledge of them.
- haematodes*. Described from Mexico, but known to us from the states along the Mexican border.
- pulvinatus*. Identified with certainty from a type sent by Dr. Taschenberg of Halle.
- varicolor*. Determined by comparison with specimens sent

me from the British Museum Collection, identified by Jacoby who had seen Suffrian's type. *Rovideus* Lec. and *laericollis* Bowd. are not distinct from these Jacobyan specimens.

dilatatus. Confused with *subfasciatus* in all American collections. A type recently sent me by Dr. Tasehenberg enables me to fix the species with certainty; it is thus far very rare in collections.

bajulus. Identified from specimens sent me by Mr. Gahan from the British Museum Collection and determined by Jacoby from Suffrian's type.

characteristicus. Recently identified from Suffrian type.

oculatus. A type sent to Bowditch seems not to be separable from *sobrinus* Hald.

spumarius. A male type from the Suffrian Collection was sent to Bowditch, and lately a female type to me. An interval of six years has dulled my remembrance of the former and I do not feel sure that the two are identical. I am basing the species on the female type but I feel that there is still some uncertainty here.

impurus. Identity established from type.

melanostictus. Identity established from type.

peccans. Identity established from type.

xanthias. Identity established from type.

obsoletus. Of this we have seen no type, and my interpretation is open to doubt. As I have identified it, this is the species which Haldeman erroneously took for the *tridens* of Melsheimer.

conformis. Identity not established with certainty. I have accepted as this species an example so labeled in the LeConte Collection.

umbraculatus. Specimens from our Mexican border states are identical with Mexican examples in the National Museum Collection so labeled by Schwarz. Others from the British Museum identified as *umbraculatus* by Jacoby appear to be a nearly immaculate form of the same thing.

litigiosus. Well known for many years, though the name has been somewhat promiscuously applied in collections. 1858. Suffrian—Linn. Ent. XII, pp. 401, 404, 406 describes the following:

- luctuosus*. Identity established with reasonable certainty from type.
- albescens*. A type from the Suffrian Collection shows this to be the same as *bivittatus* Say.
- pallidipennis*. Identity established from type.
1858. LeConte—Proc. Acad. Nat. Soc. Phila., p. 84—describes *livens* and *caelatus*.
1861. LeConte—Proc. Acad. Nat. Sci. Phila., p. 357—describes *analis*.
1873. Crotch—Proc. Acad. Nat. Sci. Phila., p. 32—describes *xanti*.
1874. Crotch—Trans. Am. Ent. Soc., V, pp. 78-79—describes *donneri* and *circumcinctus*. Crotch's types are in the LeConte Collection.
1880. LeConte—Trans. Am. Ent. Soc., VIII, p. 205-209—makes the first attempt at a tabulation of our species. Only 29 are thus treated, the remaining 20 or more being listed at the end as too indefinite for tabulation. The following new species are made known:
striatus (= *pallidipennis* Suffr.), *virgatus*, *dubiosus*, *cruentus*, *lustrans*, *renidens* (= *umbraculatus* Suffr.), *subvittatus*, *turbidus* and *brevicollis*.
1880. Jacoby—Biologia Centr.-Amer., Coleoptera, VI, Part I, p. 72—describes *laticollis* from Mexico. Of this species, first recognized by Bowditch from Brownsville, Tex., I have seen typical examples, sent me by Mr. Gahan.
1889. Jacoby—Biol. Centr.-Amer., Coleop., Part VI, Suppl., pp. 136 to 151—describes from Mexico—*thoracicus*, *marmoratus*, *immaculatus*, and *souorensis*. *Thoracicus* is at once recognizable from Jacoby's figure; the other identifications are due to Bowditch.
1909. Bowditch—Canadian Entomologist, XII, pp. 237-244, 285-292, 312-324—describes a large number of North American and a few Mexican species. The following are those from our territory, listed in order of description:
- | | | |
|-------------------|---------------------|----------------------|
| <i>brunneus</i> | <i>jacobyi</i> | <i>minor</i> |
| <i>wickhami</i> | <i>mellitus</i> | <i>lodingi</i> |
| <i>discoideus</i> | <i>coloradensis</i> | <i>marginipectus</i> |
| <i>marginatus</i> | <i>densus</i> | <i>punctatus</i> |

<i>arizonensis</i>	<i>nubilus</i>	<i>texanus</i>
<i>signatus</i>	<i>longus</i>	<i>pusillus</i>
<i>sanrita</i>	<i>proximus</i>	<i>rotundicollis</i>
<i>snowi</i>	<i>truncatus</i>	<i>atomus</i>
<i>crassus</i>	<i>nero</i>	<i>confusus</i>
<i>cylindricus</i>	<i>serier</i>	<i>varians</i>
<i>tumidus</i>	<i>lucris</i>	<i>croftus</i>
		<i>lucricollis</i>

Of these I have seen types, cotypes or topotypes of all except *discoideus*, which is represented solely by the unique type in the Snow Collection. From the description I am quite positive it is only a slight variant of what we have long known as *limbatus* Newm., but as Newman's name is preoccupied by Ménétrés (1836), *discoideus* becomes the name of the species. *Serier* also seems to be not distinct from *carolinensis*; *atomus* is in my opinion a form of *atomarius*; *rotundicollis* I believe to be the true *abdominalis* of Say; and *lucricollis* is nearly typical *renidens* Lec. which in turn is not separable from the older *varicolor* of Suffrian.

1910. Bowditch—Can. Ent., XLII, pp. 53-56—describes *notatus*, *carolinensis* and *shasta*. Of these the unique type of *notatus* is in the Snow Collection and the species is unknown to me. *Shasta* is a maculate form of *punctatus* Bowd.

1910. Blatchley—Coleoptera of Indiana pp. 1127, 1130—describes *elegans* and *sticticus*. The former name is preoccupied by Graells—Mem. Acad. Madrid, 1851, p. 153—and the species has been renamed *praeclarus* by Weise (Wien. Ent. Zeit., 1913, p. 219). *Sticticus*, I am convinced, is the same as *sobrinus* Hald.

Generic Affinities

The only genera of the Cryptocephalini with which *Pachybrachys* might by any possibility be confused are *Cryptocephalus* and *Griburius*.² Of these, *Cryptocephalus* is separable with certainty by a number of structural differences; *Pachybrachys* and *Griburius* are, however, very closely allied, and while the latter, by its comparatively large size, very robust body and regular series

² The use of the name *Scotochrus* Suffr. in place of the older *Griburius* Hald. by European authors is entirely unwarranted.

of elytral punctures possesses quite a distinct facies, there are really scarcely any constant taxonomic characters by which they may be separated. The prosternal character given in the LeConte & Horn Classification is not constant, and that given by Suffrian—"prosternum sulcate" in *Pachybrachys* and "feebly longitudinally tumid at middle in *Griburius*" is open to the same criticism. In the rather slender material in *Griburius* in my own collection, including five native species, I note that the tibiae are completely unarmed at tip in the males of all species, and in both sexes of some. Whether or not this holds true in the numerous Mexican species I know not, but the character may be useful in our own fauna at least. The following table presents the characters observed for separating the three genera in question.

Prothorax not margined at base, the edge finely crenulate; anterior margin of prosternum prominent at middle, the intercoxal process impresso-emarginate at tip with more or less sharply prominent angles; front thighs not incrassate, tibiae without terminal spurs.

Cryptocephalus

Prothorax margined at base, the edge not crenulate; anterior margin of prosternum sinuate at middle, intercoxal process not emarginate at tip; front thighs incrassate (except *hepaticus* group).

Prosternum often flat or feebly tumid along the median line, intercoxal process longer, cordate pointed, the angle narrowly rounded; all tibiae unarmed in the ♂.

Griburius

Prosternum sulcate, intercoxal process less produced, the apex more obtusely but more sharply angulate; middle tibiae with terminal spur in both sexes (except *hepaticus* group).

Pachybrachys

Review of Structural Characters Useful in Taxonomy

In order to avoid a considerable amount of circumlocution and useless repetition in the systematic part of the work, it will be profitable before proceeding to the tables and specific descriptions to pass in review the various parts of the body, pointing out those characters which are of value in the separation of species, as well as those which from their universality or individual variability are of little use in this respect, and may therefore in great part be omitted from the descriptions.

General form.—The form of body throughout the genus does not vary greatly and may be described as short, compact, sub-cylindrical. The ratio of length to width averages about 100 to 56, varying, according to measurements made, from 100 to 48 in a particularly slender male of *sobrinus*, to 100 to 63 in an

especially robust *xanti*. Unless the form is either exceptionally elongate or robust, no mention will be made of it in the descriptions.

Head.—The head is relatively larger and less deeply inserted in the prothorax than in *Cryptocephalus*, always visible from above, varying in width from slightly more than half that of the prothorax to very nearly that of the latter, the extremes being represented in but very few species. In a large majority of species the eyes are not appreciably more prominent than the anterior thoracic angles, or in other words, a line continuing the side margins of the prothorax at the front angles would pass tangent to the eyes or very nearly so. In a small number of species the eyes are distinctly more prominent and would be intersected by the produced side margins of the prothorax. These differences are covered in the descriptions by such expressions as "head not wider than the thoracic apex," or "eyes more prominent than the thoracic angles." The *front* is nearly flat or broadly feebly convex in all species, the median line more or less impressed, especially toward the vertex. The punctuation is uniform throughout in a few species, but as a rule is denser on the vertex, in and adjacent to the median line, and about the base of the antennae. As the punctures are nearly always of some shade of brown or blackish, it follows naturally that the more densely punctate areas are darker in color, and in fact determine the position of what are called in the descriptions the standard markings. As a corollary of this proposition it follows that the uniformly punctate head is unicolorous, but it should be remarked that the converse of this is not necessarily true.

Ocular lines.—In all species there is a more or less distinct impressed line around and contiguous to the upper margin of the eye. This impressed line, in the majority of species, continues strictly marginal around the upper lobe of the eye and becomes gradually evanescent in the emargination; but in many species the groove around the upper margin diverges more or less from the eye and is continued on the front between the upper lobes as an impressed line of punctures gradually disappearing inferiorly. These two conditions are indicated in the descriptions by the expressions "front with (or without) ocular lines," or more briefly "ocular lines present"—"or wanting." This character,

though seemingly trivial, is unusually constant, seldom difficult to interpret, and of great value in the tabulation of the species.

Eyes.—The eyes vary greatly specifically in size and degree of approximation and are therefore of very great aid in classification. In order to make full use of them, however, it is necessary to express their distance asunder more exactly than by the terms “near” or “remote” as hitherto, and I have for this purpose chosen as a standard of comparison either the length of the basal joint of the antennae, or the vertical width of the upper lobe of the eye. In the greater number of species the eyes in the male are separated by a distance from one to two times the length of the basal antennal joint. If the distance be less than the length of the basal joint the eyes may properly be called near, and if greater than twice the length of this joint they may be called remote; these terms, however, are not much used in the following descriptions. It should be remembered that since the width of the front between the eyes is measured in terms of the length of the basal antennal joint of the insect itself, and since the length of this joint is often somewhat greater in the male than in the female, the results cannot be directly compared.

Antennae.—These organs are remarkably uniform in structure, and aside from some variation in length and thickness offer very little in the way of specific differences. In the aberrant *microps* the antennae are sensibly thickened externally, but in all other species they are virtually filiform. The first joint is always stouter, more or less broadly oval; the second somewhat similar in form but much smaller; third more slender and longer than the second, gradually wider apically; the next two or three similar but increasing in length, the outer five or six subequal in length, the tenth usually visibly shorter; the eleventh appendiculate. In *hepaticus* and *microps* these organs are scarcely half as long as the body in the male, while in males of *luridus*, *trinotatus*, *nubilus* and several others they are nearly or quite as long as the body. In the great majority of species the antennae are about three-fourths the length of the body in the male, the length—with very few exceptions—being somewhat shorter in the female. In the descriptions following, the length in terms of the body is usually given, and frequently the length of the tenth joint in terms of the width, this ratio being a fair index of the

degree of slenderness of the organ. Other details would be of little use and largely a matter of repetition.

Prothorax.—The form of the prothorax varies somewhat but is not of much use in the separation of species. It is more or less wider than long in all species, and is nearly always distinctly widened posteriorly, but in a few species, *e. g.* *quadratus*, the base is scarcely wider than the apex. There is a definite basic color scheme which will be alluded to below, and it may be said here as of the head, that the darker areas are more closely punctate. The density and coarseness of punctuation naturally varies considerably in so large a genus, but in only one respect have I found it signally useful in tabulating the species. In a large majority of species the punctuation becomes distinctly sparser or almost disappears along the side margins, but in quite a number of forms the surface is nearly equally densely punctured to the extreme margins.

Elytra.—The only important characters drawn from the elytra aside from the markings are those of punctuation. In the most completely striate forms, of which *pallidipennis* is the best example, there are a sutural, marginal and eight discal striae on each elytron. The sutural stria diverges obliquely from the suture anteriorly and within it in the scutellar region are one or two short lines of punctures which are, however, in most species quite irregular or completely confused. In the following descriptions the discal striae only are numbered, that next to the sutural being called the first, and the one next within the marginal the eighth or submarginal stria. From the completely striate *pallidipennis* to the entirely confusedly punctate *microps* there is every intermediate stage of regularity or irregularity of strial development. In the vast majority of species the striae are, in part at least, more or less obvious, the eighth being most persistent, while fragments at least of some of the others are visible on the declivity. The first discal stria diverges from the suture anteriorly as does the sutural one, and both are often lost in the confused punctuation of what I have called the *baso-sutural region* or *triangle*. In very many species the first stria suffers either a gradual or an abrupt displacement toward the suture, at or about the middle of the elytra, enclosing between it and the second stria at this point a small area which Mr. Bowditch has called the

shield. This area is usually a little elevated, often quite small, and in many species subobsolete or completely wanting. In the great bulk of more or less obviously striate species, striae three, four, seven and eight are most likely to be well developed or entire, while five and six are very often broken or confused at and in front of the middle, remaining distinct in their posterior half. In most species there is a sinuation, displacement or confusion of the punctures of the eighth stria just behind the humerus, which I have spoken of in the descriptions as the *sub-basal interruption of the eighth stria*. A character of some value exists in the punctuation of the marginal interspace, this being virtually free from punctures in numerous species, while in many others it is variably punctate.

Body beneath.—No characters of any moment have been drawn from the under body, the structure, sculpture and vestiture being sensibly uniform throughout.

Legs.—The front thighs are distinctly incrassate in all species except the aberrant *hepaticus* and *microps*, in which, moreover, the tibiae are entirely without apical spurs. In all our other species the middle tibiae are armed with a slender apical spur. The front tibiae are armed with a somewhat thicker and shorter spur except in a very few species—*m-nigrum*, *trinotatus* and *pulvinatus*—in which it appears to be wanting. The hind tibiae are unarmed except in three of the pubescent species—viz., *pubescens*, *haematodes* and *integratus*. The front claws are in many species obviously larger than those of the middle and hind feet. This is especially noticeable in the males, but is in these species also detectable in the females. In many others there is scarcely any difference in the size of the claws, though careful comparison will almost always show the front ones to be a trifle larger.

Vestiture.—Some fourteen species have the upper as well as the under surface distinctly pubescent, and these are naturally tabulated together as a group. Of the remaining species, one only—*fortis*—shows any appreciable signs of pubescence above.

Color and Markings.—The typical *Pachybrachys* is of some shade of yellow, with markings of black or brown, which—following Bowditch—I have called the standard spots. These are as follows: On the head, a vertex spot—usually transverse—an

elongate frontal spot, often connected with the one on the vertex and usually forked inferiorly, a branch extending on either side to the antennal fovea, the branches not infrequently interrupted, leaving an isolated antennal spot. In a reduction of the markings the antennal spots first disappear, then the frontal one, and finally the vertex spot, which is rarely entirely lacking. On the other hand all spots may become larger and by suffusion the entire surface becomes dark, the entire obliteration of the pale color from the head being, however, of rare occurrence. On the prothorax there are three standard spots extending forward from the base a variable distance, the middle one divided anteriorly and joining the lateral ones, forming an M-shaped mark, which in descriptions is briefly called the M. Here by reduction the spots become smaller and disconnected, finally disappearing at the base; or on the other hand they may become much heavier, leaving only two basal spots, a narrow median anterior line, the outer margin—wider at the front angles—and the anterior margin, pale; or they may be irregularly developed and suffused, and finally the whole surface becomes black. On the elytra the standard spots are six in number; an outer marginal or submarginal series of three, and a corresponding discal series of like number. Not rarely the spots are all more or less completely isolated or individually distinct; in a few species the spots of each series are longitudinally confluent into more or less regular vittae, but in a far greater number they are more or less unequally developed and irregularly confluent both longitudinally and transversely, giving rise to a mottled appearance difficult to describe, and often so variable within specific limits that it can only be characterized as one of the broadly typical varieties of the standard markings.

Pygidium.—Blackish with a small marginal pale spot each side and two obliquely oval apical spots of variable size, often confluent with each other and with the small lateral spots. By a reduction of the pale spots the surface may become entirely black, or by their extension the black area is reduced to a basal band produced backward a little at its extremities and having a median cusp-like prominence, and in a few species the surface becomes entirely pale.

Body below.—Blackish or brownish, usually with the epimera, sides of the abdomen and last ventral segment paler.

Appendages.—The antennae are rarely entirely yellow or entirely black; typically they are pale basally with the first two joints more or less blackish on the upper side, and the outer four to six joints more or less dusky or blackish. Legs yellow with the tarsi dusky, tibiae with a dark apical or subapical cloud, the femora with a median dark spot or ring. By reduction the legs may become entirely pale, while by an extension of the dark marks they become black with the extremities of the femora and bases of the tibiae narrowly pale—and more rarely entirely black.

Sexual characters.—In common with most Coleoptera the males are, on the average, smaller and less robust than the females. The abdomen in the male is flat or more or less concave in profile, the last ventral flat or broadly feebly impressed; in the female the abdomen is convex beneath, the last segment with a deep rounded fovea. With few exceptions the antennae are obviously longer in the male; the basal joint is also often somewhat larger in this sex, but these organs are not otherwise modified sexually in our species.³ The terminal joint of the maxillary palpi is in many species more widely truncate at apex in the male; the front tibiae are modified at apex in two species, the front tarsi are sometimes visibly broader, while the front claws are slightly to quite strongly enlarged in numerous species in this sex. In the female the terminal joint of the maxillary palpi is pointed with the tip narrowly truncate as a rule, and the front claws are usually just visibly larger than those of the four posterior feet. The hind thighs are in general more elongate in the males according to Jacoby, but I am inclined to believe this is more apparent than real, the thighs seeming to be shorter in the female because of the greater length of the ventral surface in this sex. As a result, they attain the last segment in the female, while they reach the abdominal apex in the male. There is obvious a general tendency to a broader, more suffused maculation in the female, as well as a denser more confused punctuation.

The tabulation of the great number of species involved in this revision, even in the imperfect way in which it has been accomplished, has proven a very difficult task. Just as was found to be

³The terminal joint is somewhat dilated in the male of *laticollis*.

the case in a recent review of our species of *Diplotaxis*, so in *Pachybrachys* there seem to be almost no characters which afford the means of dividing the genus into natural groups. As in *Diplotaxis*, so here, a small number of species—less than one-tenth of the whole number—are separable with certainty by reason of the pubescent upper surface. Two other species—*hepaticus* and *microps*—are differentiated by good characters, but the great mass of species seems incapable of further reduction in this manner. In this great complex of species I have been forced to adopt color as a basis for primary grouping, and this notwithstanding the fact that color—in its smaller details—is the most variable of all the characters used. In the broader sense, however, it is quite serviceable, and it is usually possible for even the inexperienced student to decide whether his specimen should be looked for among the *black*, the *yellow*, the *vittate* or the *maculate* species. The great difficulty comes of course in the last named group, for here the variation may be so great that individuals of the same species may be referred to either the black, variegated or yellow groups. This difficulty has been in large measure overcome by tabulating in more than one group those species known to be exceptionally variable. It has manifestly not been possible to provide for all contingencies of this sort, and it would therefore be well if the student does not find his species in the group in which it would appear to belong to try the next most probable group before giving up the search.

In the reading of the specific descriptions which follow, it must be remembered that there are no fixed characters; everything without exception is subject to individual variation. The study is really a most difficult one and the student must not expect to be able at all times to identify uniques, especially if they be females. Even with a good series and considerable experience the problem will often be difficult enough.

It is hoped that the short diagnosis before the more detailed descriptions will prove of service by enabling the student to very quickly decide upon the possibility, or at least probability, of that particular species being the one in hand. The average length given in the short diagnosis is in general that of either a large male or a small female, and of course will serve only as a general guide, the actual known limits of size being given at the

end of the detailed description. Unless otherwise stated, all types are in the author's collection.

Table of Groups

Front thighs not at all stouter; tibiae completely unarmed; eyes very small and remote Group F

Front thighs always thickened; middle tibiae always, and front tibiae except very rarely, with terminal spur; eyes large and less remote.

Upper surface distinctly pubescent Group A

Upper surface glabrous or virtually so.

Species wholly or in great part yellow or testaceous, the legs never entirely black; thoracic M not sharply defined (except *pallidipennis*) though often faintly or vaguely indicated by diffuse brownish clouds; punctures usually of some shade of brown; elytra with rare exceptions without dorsal cloud or traces of standard spots. . . . Group B

Species yellow or testaceous with black or brown markings representing the standard spots, the markings varying greatly in development, both by reduction and extension, and often irregularly confluent or confusedly mottled.

Group C

Species having the elytra more or less distinctly vittate.

Group D

Species wholly or in great part black, the pale areas generally few and small, but in a few species more extensive and definitely arranged Group E

Table of Species

Group A

Pubescent species

The group character possessed by all the species here included, is so definite as to need no elucidation. In only one species (*fortis*) of the following groups have I observed any appreciable pubescence on the upper surface, and there it is so sparse and inconspicuous as to easily escape notice.

1. Hind tibiae without terminal spur 2

Hind tibiae with slender terminal spur.

Elytral punctuation completely confused, eyes widely distant.

- Sides of prothorax less rounded, pubescence shorter and less conspicuous, color entirely black. 1. **pubescens**
- Sides of prothorax more rounded posteriorly, pubescence longer and more conspicuous, color black, frequently with diffuse rufous markings. 2. **haematodes**
- Elytral punctation in part serially arranged; color yellowish with broad diffuse brown or fuscous markings; eyes almost in contact in the ♂. 3. **integratus**
2. Eyes contiguous in ♂. 5. **vigilans**
- Eyes not in contact.
- Pubescence unusually dense, obscuring or nearly concealing the sculpture of the head or prothorax or both.
- Head not much narrower than the prothorax; black, elytra with fulvous markings. 6. **wickhami**
- Head much narrower than the prothorax; black, prothorax red in posterior third or fourth. 7. **thoracicus**
- Pubescence much sparser, not concealing the sculpture. 3
3. Prothorax without trace of median smooth line. 4
- Prothorax with narrow entire or subentire smooth median line.
- Prothorax with sides more rounded, not or scarcely wider at base than at basal third.
- Black, side margins of prothorax and humeral and apical margins of elytra yellow, the disk also frequently with pale markings; more rarely in great part pale. 8. **analis**
- Rufo-testaceous with faint rufous or livid clouds, which are rarely more pronounced; eyes as a rule less widely separated. 9. **desertus**
- Prothorax conical, widest at base, sides less rounded.
- Rufo-testaceous, the prothoracic M faintly indicated by brownish shades, interstitial punctures of the elytra coarser and more numerous; form stouter as a rule. 10. **xanti**
- Fulvo-testaceous, prothoracic M black and sharply outlined, rarely fainter; elytra either entirely yellow or with blackish markings which vary much in extent and intensity, interstitial punctures finer and less numerous; form a little less robust as a rule.
11. **marmoratus**
4. Surface polished throughout; rufo-testaceous, elytra with subsutural and marginal black stripes, which are connected narrowly along the base and more broadly along the declivity. 4. **connexus**
- Surface alutaceous and more or less strongly opaque.
- Testaceous, with faint diffuse darker shades, the latter sometimes more pronounced and occasionally involving the entire disk of both thorax and elytra except a narrow pale external margin; eyes in the ♂ separated by about $1\frac{1}{2}$ times the length of the basal antennal joint.
14. **brunneus**
- Black, side margin of prothorax and occasionally of the elytra, especially at the humeri, pale, disk rarely feebly and obscurely varied with pale; eyes in the ♂ separated by much more than twice the length of the

basal antennal joint, their distance asunder nearly equalling the vertical length of the eye12. **donneri**
 Color similar to *donneri*, except that the discal pale markings are more conspicuous; eyes in the ♂ separated by twice the length of the basal antennal joint, the distance obviously less than the vertical length of the eye; prothoracic punctuation finer13. **uteanus**

Group B

(Starred species (*) are tabulated in more than one group.)

This group includes those species which are—so far as our experience goes—normally almost entirely yellow or testaceous, at least so far as the elytra are concerned. In *diversus* and *petronius* the elytra are sometimes more or less suffused with brown along the suture, but seemingly always without lateral spots. In *tacitus* the brown color of the striae posteriorly, forming incipient markings, while in *punctatus* * (especially in the female), *convictus**, *sublimatus**, *nubilus**, *conspirator**, *caelatus* * and *mitis*, specimens have been seen with some of the elytral markings more or less developed, though these are usually quite small and inconspicuous.

1. Prothorax with broad heavily marked black M; size rather large (3.5 to 4.5 mm.); elytral striae all regular and entire.....138. **pallidipennis**
 Prothoracic M never black and sharply defined; elytral striation less perfect, often very imperfect or wanting.....2
2. Prothorax as wide at base as the base of the elytra (at least in the ♀), strongly narrowed in front; punctuation very much finer than that of the elytra15. **purus**
 Prothorax often very nearly but never with the basal width absolutely equal to that of the elytra3
3. Prothorax and elytra with a more or less evident secondary system of fine rather sparse interstitial punctures.....16. **mellitus**
 Prothorax and elytra without obvious interstitial punctuation (a few very minute punctures are detectable—especially on the prothorax—of certain species)4
4. Marginal interspace of the elytra more or less conspicuously punctate, the submarginal (8th) stria often ill defined or even completely confused with the punctures of the interspace.....5
 Marginal interspace of elytra either impunctate or at most with a few punctures at or near the post-humeral interruption of the 8th stria11
5. Front with ocular lines.....6
 Front without ocular lines9
6. Front claws of ♂ not appreciably larger than those of the middle and hind feet7
 Front claws of ♂ obviously enlarged8

7. Submarginal stria of elytra fairly regular, the margin and interspace nearly or quite devoid of punctures in apical half; prothorax more narrowed in front and more rounded on the sides; eyes not more prominent than the anterior angles of the prothorax; elytral shield well developed; ocular lines quite near the eyes. 20. **immaculatus**
 Submarginal stria of elytra less regular, often completely undelimited or confused with the punctures of the marginal interspace, which is punctured from base to apex; sides of prothorax straighter and less convergent in front; eyes more prominent; ocular lines more distant from the eyes; elytral shield feebly indicated or entirely wanting.
 Eyes in ♂ separated by more than twice the length of the basal antennal joint; color pale whitish yellow, size larger (3 to 4 mm.) 18. **jacobyi**
 Eyes in ♂ separated by about twice the length of the basal antennal joint, color darker, more dingy yellow, size smaller (1½ to 2½ mm.) 19. **densus**
8. Sutural edge, and usually the posterior two-thirds of the outer marginal edge of the elytra very narrowly blackish; front claws of ♂ rather strongly enlarged. 22. **marginipennis**
 Sutural edge blackish, margin not at all so.
 Front claws of ♂ not very strongly enlarged though obviously so, elytral shield nearly or quite absent. 23. **punctatus**
 Elytra maculate with black. var. **shasta***
 Front claws of ♂ quite strongly enlarged; punctuation somewhat coarser, the elytral striae better defined and more impressed; elytral shield evident. 24. **convictus**
 Sutural edge not darker; front claws of ♂ obviously but not strongly enlarged; elytral lobe nearly or quite devoid of the usual marginal series of punctures. 25. **arizonensis**
9. Integuments polished. 29. **mercurialis** var.
 Integuments alutaceous and not shining. 10
10. Eyes much more distant in both sexes than the vertical width of their upper lobes.
 Submarginal stria of elytra impressed, regular. 26. **lodingi**
 Submarginal stria of elytra not distinctly impressed, the punctures confused. 129. **sublimatus**
 Eyes less distant in the ♂, but not in the ♀, than the vertical width of their upper lobes. 61. **impurus** var. **xanthus**
 Eyes less distant in both sexes than the vertical width of their upper lobes. 27. **placidus**
11. Submarginal interspace of elytra more or less prominent or subcostiform; size rather large (3½ to 4 mm.) 127. **liebecki**
 Submarginal interspace of elytra not prominently convex. 12
12. Eyes of ♀ separated by fully twice the length of the basal antennal joint. 43
 Eyes of ♀ separated by barely twice the length of the basal antennal joint. 21
 Eyes of ♀ separated by about 1½ times the length of the basal antennal joint; front without ocular lines. 41. **crassus**

- Eyes of ♀ separated by the length of the basal antennal joint or scarcely more; front with feeble ocular lines.....42. **longus**
13. Front claws of ♂ not appreciably larger than those of the middle and hind feet14
 Front claws of ♂ evidently larger than the others20
14. Front without ocular lines15
 Front with more or less distinct ocular lines18
15. Integuments polished; front as a rule more sparsely punctate16
 Integuments finely alutaceous, scarcely shining; front more closely punctate17
16. Labrum rather deeply emarginate; form more robust; elytra more conspicuously wider at base than the prothorax; color deeper yellow, size larger17. **xantholucens**
 Labrum broadly feebly sinuato-truncate; form less robust, humeri less broadly exposed, size smaller.
 Eyes in ♂ separated by fully twice the length of the basal antennal joint; antennae (♂) not quite so long, the 10th joint scarcely 3 times as long as wide; elytral striae more regular29. **mercurialis**
 Eyes in ♂ separated by about $1\frac{3}{4}$ times the length of the basal antennal joint; antennae (♂) nearly as long as the entire body, the 10th joint 4 times as long as wide124. **nubilus***
 Eyes in ♂ separated by about $1\frac{2}{3}$ times the length of the basal antennal joint; antennae as in *nubilus*; elytral striae more broken and confused125. **conspirator***
17. Prothoracic M diffuse but nearly complete, punctuation of elytra coarser and less confused, size smaller31. **mitis**
 Prothoracic M represented by three small basal spots, of which the lateral ones are often faint; punctures of elytra finer, more numerous and more confused30. **parvinotatus**
18. Eyes separated by fully 3 times the length of the basal antennal joint in the ♂; front polished, ocular lines fine; color pale whitish yellow.
 32. **coloradensis**
 Eyes separated by from 2 to $2\frac{3}{4}$ times the length of the basal antennal joint in the ♂; ocular lines very distinct.
 Prothorax with a usually nearly parallel and entire rufo-testaceous stripe occupying the middle third28. **livens**
 Prothorax without median darker stripe33. **minor**
 Eyes separated by about $1\frac{2}{3}$ times the length of the basal antennal joint in the ♂19
19. Elytral striae nearly regular throughout, confused only in a small scutellar area; prothorax small, sides nearly straight34. **nero**
 Elytral striae badly broken or contorted at the middle of the disk.
 Prothorax a little shorter and more transverse, median spot narrowly divided apically; striae finer, elytra with seemingly no tendency to lateral maculation but with the suture often darker.35. **petronius**
 Prothorax slightly less transverse, sides a trifle more rounded, median spot less narrowly divided; lateral spots of elytra sometimes indicated; striae less fine, more impressed36. **tacitus**

20. Front with ocular lines.
 Prothorax a little larger and more rounded on the sides; eyes very slightly more distant; sutural edge blackish. 37. **abdominalis**
 Prothorax smaller, sides less rounded; eyes slightly less distant; elytral suture not or scarcely darker. 38. **diversus**
 Front without ocular lines 76. **caelatus***
21. Front with fine ocular lines; front claws of ♂ not appreciably larger.
 39. **pusillus**
 Front without ocular lines; front claws of ♂ very large. 40. **macronychus**

Group C

(Starred species (*) are tabulated in more than one group.)

In this, the central and largest group of the genus, there is great variation in the extent of maculation, and consequently in the relative proportions of the dark and pale areas. In *rittaticollis*, *fractus*, *varicolor*,* *fortis*, *alacris*, *caelatus*,* *nubilus** and *conspirator*,* the elytra are—at least in some individuals—almost entirely yellow; while in *wenzeli*,* *signatifrons*,* *melanostictus*, *vestigialis*,* *californicus*,* *pinguescens*,* *varicolor** and *luctuosus*, the elytra may become almost entirely black. Tabulation has proved especially difficult in some parts of this series, and the student may fairly expect to find it hard at times to decide which line to follow. In such cases, both alternatives may have to be tested, and final judgment based upon the detailed descriptions.

Notatus Bowd. is for the present placed near *pinguescens* in the table. I have not seen the unique type, and a letter of inquiry concerning it to Prof. S. J. Hunter, in charge of the Snow Collection, brings the information that both front tarsi are missing, hence the impossibility of placing it with certainty in the scheme here adopted.

1. Eyes in the ♂ separated by a distance less than the length of the basal antennal joint (*alacris* tentatively placed, ♂ not yet known) 2
 Eyes in the ♂ separated by a distance equal to or greater than the length of the basal antennal joint, but not greater (usually distinctly less) than the length of the first two joints. 6
 Eyes in the ♂ separated by a distance greater than the length of the basal two joints of the antennae (not at all greater in one example of *robustus*, scarcely so in *californicus* and only slightly greater in *precurius*) 18
2. Front claws of ♂ very small, not at all larger than those of the middle and hind feet. (Arizona.) 13. **bullatus**
 Front claws of ♂ more or less enlarged. 3

3. Front tibiae of ♂ sinuate on the inner margin at the apex and with a long hook-like spur or process at the inner angle.
 Eyes separated in the ♂ by about $\frac{2}{3}$, and in the ♀ by barely the length of the basal antennal joint; size smaller (2.4 to 2.8 mm.). (Brownsville, Texas.).....44. **texanus**
 Eyes separated in the ♂ by about $\frac{3}{4}$, and in the ♀ by just visibly more than the length of the basal antennal joint; size larger (2.9 to 3.5 mm.). (Arizona.).....45. **uncinatus**
 Front tibiae sinuate on the inner margin beyond the middle in both sexes. (New England to Illinois.).....46. **pectoralis**
 Front tibiae unmodified.....4
4. Front with ocular lines; form narrower. (Eastern United States.)
 47. **sobrinus**
 Front without ocular lines; form generally stouter.....5
5. Antennae less slender, the 10th joint (♂) not more than three times as long as wide.
 Intermediate elytral striae broken and irregular. (Arizona.)
 48. **contractifrons**
 Elytral striae nearly regular. (Arizona.).....49. **alacris**
 Antennae more slender, the 10th joint (♂) five times as long as wide; front claws of ♂ very large.
 Punctuation throughout sparse except in the small darker pronotal markings; elytral punctuation very irregularly disposed, the submarginal and some short fragments of striae on the declivity alone evident. (Arizona.).....50. **chaoticus**
 Punctuation of pronotum dense throughout the broad suffused darker areas; elytra moderately numerous punctate, the striae better defined. (Lower California.).....52. **peninsularis***
6. Front claws of ♂ very distinctly enlarged.....7
 Front claws of ♂ not or but little enlarged.....10
7. Sides of prothorax widely impunctate along the margin.....51. **peitatus**
 Sides of prothorax narrowly impunctate along the margin.....8
 Sides of prothorax not or scarcely smoother, the punctuation extending nearly or quite to the extreme margin.....9
8. Eyes in the ♂ separated by a distance subequal to the length of the basal antennal joint.
 Size large (about 4 mm.); prothorax strongly rounded and inflated at sides posteriorly. (Texas.).....53. **turgidicollis**
 Size much smaller (2 $\frac{1}{2}$ mm.); prothorax normally rounded at sides. Florida.).....54. **illectus**
 Eyes in the ♂ separated by $1\frac{1}{3}$ to $1\frac{1}{2}$ times the length of the basal antennal joint (a little more widely in some *punctatus*).
 Front without ocular lines.
 Pale yellow, markings faint, those of the elytra represented by faint lateral spots only; head a little wider than the thoracic apex. (Utah.)
 55. **proximus**
 Markings larger and darker, the standard spots all present, head not wider than the thoracic apex. (Arizona.).....56. **nunenmacheri**

Front with fine ocular lines which are rather near the eyes; males normally entirely yellow, rarely with traces of spots, females more often spotted (see table B). (California.)

23. **punctatus** ♀, especially var. **shasta**

24. **convictus**

9. Antennae more slender and elongate, the 10th joint four to five times as long as wide.

Eyes in ♂ separated by scarcely or but little more than the length of the basal antennal joint; prothorax pale yellow with faint brown markings; size large (4 to 5 mm.). (Arizona.) 57. **fortis**

Eyes in ♂ separated by about the length of the basal two joints of the antennae; prothorax in great part black as in typical *luridus*; size smaller (3 to 4 mm.). (Minnesota to Arizona.)

150. **luridus** ♂ var. **festivus**

Antennae less elongate, the 10th joint two to three times as long as wide, size medium (less than 3½ mm.); eyes in the ♂ separated by 1¼ to rather more than 1½ times the length of the basal antennal joint.

Dull whitish yellow or dingy testaceous, thickly punctate, and more or less suffused with brown to fuscous, the standard spots sometimes fairly distinct but usually vaguely defined.

Marginal interspace of elytra not wider posteriorly than the adjacent one; punctures and shading fuscous or blackish, this color usually predominating. (Atlantic and Gulf States.)

Legs bicoloréd. 58. **femoratus**

Legs entirely dark. var. **aquilonis**

Marginal interspace of elytra wider than the adjacent one (except rarely), the punctures and shading brown, the pale yellowish white or testaceous ground color predominant. (Florida.)

59. **characteristicus**

Rufo-testaceous, punctures and suffused areas reddish brown in the ♀, darker brown to fuscous in the ♂ (rarely so in the ♀). (Mississippi Valley.) 61. **impurus**

10. Front with ocular lines 11

Front without ocular lines. 12

11. Eyes in ♂ separated by about ½ the vertical width of their upper lobes; size larger (2.8 to 3.4 mm.). (Texas; Arizona.) 62. **calidus**

Eyes in ♂ separated by a distance subequal to the vertical width of their upper lobes; size smaller (2.3 to 3 mm.). (California; Arizona.)

61. **protopis**

12. Marginal interspace of elytra numerous punctate, size large (3.1 to 4.3 mm.) (Texas to Arizona.) 65. **wenzeli** ♀

Marginal interspace of elytra impunctate or nearly so. 13

13. Front claws of ♂ obviously though not conspicuously enlarged; size large (3.7 to 4.7 mm.) 14

Front claws of ♂ not appreciably enlarged; size small or moderate (2.3 to 3.3 mm.) 15

14. Lustre dull, prothorax very densely punctate, terminal joint of antennae dilated in the ♂; elytral striae deeply impressed. (Texas and Arizona.)
68. **laticollis**
Lustre moderately shining, prothorax not very densely punctate, terminal joint of antennae not dilated.
Elytral punctuation much confused, striae feebly impressed. (Arizona.)
66. **snowi**
Elytral punctuation more regular, striae rather deeply impressed.
(Kansas; Texas.) 67. **turbidus**
15. Eyes more narrowly separated in both sexes than the vertical width of their upper lobes; elytra with a small but conspicuous blackish sutural spot on the convexity. (Brownsville, Texas.) 69. **duryi**
Eyes in the ♀ as widely separated at least as the vertical width of their upper lobes; elytra without conspicuous sutural spot on the convexity. . . 16
16. Integuments polished 124. **nubilus***
Integuments with more or less distinct alutaceous sculpture. 17
17. Side margins of prothorax smooth, markings throughout black or nearly so, and more sharply contrasting. (Texas.) 70. **gracilipes**
Side margins of prothorax punctate more or less completely; markings brown to fuscous and less sharply defined.
Eyes in ♂ separated by fully $1\frac{1}{3}$ times the length of the basal antennal joint; prothorax less densely punctured along the side margins. (Atlantic States.) 71. **confederatus**
Eyes in the ♂ separated by scarcely more than the length of the basal antennal joint; prothorax more densely punctured along the side margins. (Georgia.) 72. **tybeensis**
18. Front tibiae of ♂ emarginate inwardly at apex and with a long spur-like process at the inner angle. 73. **calcaratus**
Front tibiae of ♂ unmodified 19
19. Front claws of ♂ strongly enlarged 20
Front claws of ♂ perceptibly larger than the others but in variable degree (quite conspicuously so in *badius* and *nubigenus*, only very slightly so in *bajulus* and *delumbis*) 22
Front claws of ♂ not appreciably enlarged (perceptibly larger in *subvittatus*, presumably so in *spanmarinus* and quite distinctly so in some examples of *roboris*) 20
20. Prothoracic punctuation equally close to the extreme side margin (a little smoother in those examples of *californicus* having the side margins yellow); predominant color black.
Elytral punctuation confused throughout; lustre dull. (Southern States.) 149. **confusus***
Elytra distinctly striate toward the sides and rear; lustre strongly shining. 118. **californicus***
Prothoracic punctuation sparser or absent along the side margins. . . . 21
21. Prothorax finely sparsely punctate, elytral striae much broken, color predominantly pale yellow, size rather large (3.3 to 4.3 mm.). (Arizona.)
74. **cylindricus**

Prothorax less finely and more densely punctate.

Size rather large (3.5 to 4 mm.); black markings heavy and more or less broadly suffused.

Antennae with 10th joint (σ^7) less than $3\frac{1}{2}$ times as long as wide. (Arizona.) [Species doubtfully placed.] 75. **notatus**

Antennae with 10th joint (σ^7) four times as long as wide. (Arizona; California.) 119. **pinguescens***

Size moderate (2.5 to 3.2 mm.); color predominantly yellow—except rarely in *caelatus*.

Eyes separated by fully twice the length of the basal antennal joint in the σ^7 , and by nearly the entire length of the eye in the τ ; striae nearly regular. (Texas to California.) 76. **caelatus***

Eyes separated by much less than twice the length of the basal antennal joint in the σ^7 , and much less than the length of the eye in the τ . (Texas.) 77. **brevicollis**

22. Front with ocular lines 23

Front with ocular lines faintly indicated and quite near the eyes; markings black, variable; elytral striae generally ill-defined and feebly impressed; front claws rather strongly enlarged. (California to Colorado.)

85. **vacillatus**

Front without ocular lines. 26

23. Elytral punctuation largely confused, striae at sides and rear very irregular or fragmentary; markings brown and diffuse, a posterior fascia sometimes conspicuous; ocular lines often feeble or subobsolete. (Texas to Arizona.) 81. **postfasciatus**

Elytra more or less distinctly striate at sides and rear. 24

24. Punctures and markings of upper surface brown or rust colored, sometimes becoming blackish on the elytral disk in the σ^7 ; eyes in the σ^7 separated by a little less than twice the length of the basal antennal joint.

Elytral striae much confused, only one or two outer striae and the apical portions of the discal ones well defined; ocular lines quite near the eyes; marginal interspace of elytra numerous punctate, size larger (3.2 to 3.5 mm.). (California.) 78. **nubigenus**

Elytral striae fairly regular from base to apex in more than outer half; ocular lines distant from the eyes; marginal interspace of elytra with very few punctures; size smaller (2.5 mm.). (California.) 79. **punicus**

Punctures and markings of upper surface entirely black or fuscous in mature specimens (except possibly in some examples of *signatus*) 25

25. Front claws of σ^7 distinctly enlarged, perceptibly so in the τ ; eyes in the σ^7 separated by barely twice the length of the basal antennal joint. (Maine to British Columbia.) 81. **peccans**

Front claws of σ^7 only slightly larger, scarcely so in the τ ; eyes of σ^7 separated by fully twice the length of the basal antennal joint.

Markings very variable in development; front claws of σ^7 a little more obviously enlarged. (Pacific States.) 80. **melanostictus**

Black, yellow markings few and small; front claws of σ^7 very little enlarged. (California.) 82. **signatifrons***

Yellow, with median thoracic stripe and posterior elytral fascia blackish; front claws of ♂ but little enlarged. (Arizona to Texas.)

83. **signatus**

26. Prothoracic markings always more or less diffuse, reddish or pale brown to fuscous, elytral spots more or less pronounced 27

Prothoracic markings in the form of three somewhat irregular heavily marked black vittae, which are not or only narrowly connected in front, and are sharply defined; elytral spots nearly or quite wanting. (Arizona.)

91. **bajulus**

27. Pronotum almost completely suffused with reddish brown, the punctuation of the disk dense and nearly uniform; front claws of ♂ rather strongly enlarged. (California.) 86. **badius**

Pronotum lightly to heavily variegated with pale brown to fuscous, the punctuation less dense and more uneven, the front claws of the ♂ less conspicuously enlarged 28

28. Front claws of ♂ quite noticeably though not strongly enlarged.

Prothorax only just perceptibly wider than the head, scarcely at all narrowed in front, the base and apex subequal. (California.)

87. **quadratus**

Prothorax obviously wider than the head though not greatly so, sides a little convergent in front, the apex never as wide as the base.

Punctuation less dense, front claws of ♂ slightly more enlarged. (California to Texas.) 88. **mobilis**

Punctuation more dense, front claws of ♂ rather less enlarged. (California.) 90. **pluripunctatus**

Front claws of ♂ only very slightly larger than the others, eyes a little less distant. (Texas.) 89. **delumbis**

29. Head and prothorax and usually the elytra distinctly alutaceous, dull or at most moderately shining 30

Head and upper surface strongly shining, polished or with but the faintest trace of alutaceous sculpture 47

30. Size large (4 to 6 mm.); elytral punctuation almost completely confused . 31

Size somewhat smaller (3.7 to 4.25 mm.); elytral striae very imperfect and fragmentary but present at least toward and on the posterior convexity; prothoracic markings reddish brown, broadly suffused, the elytral spots black, heavy. (Arizona.) 94. **sanrita**

Size moderate or small, always less than 4 mm., rarely over 3.5 mm. . . . 32

31. Antennae extremely slender and filiform, 10th joint four to five times as long as wide; pygidium of ♀ widely margined. (Arizona.) . 92. **nobilis**

Antennae less slender, 10th joint about three times as long as wide; pygidium of ♀ normally margined.

Legs fuscous. (New Mexico.) 93. **fuscipes**

Legs rufo-testaceous. (Arizona.) . . var. **purgatus**

32. Prothoracic punctuation dense to side margins 33

Prothoracic punctuation sparser or absent along the side margins, the latter narrowly smooth, at least in part 35

33. Punctures and markings black or fuscous 34

- Standard elytral spots wanting except the basal and apical ones of the outer series. (Georgia.) 109. **quadri-oculatus**
- Standard elytral spots—except the one on the humeral umbo—wanting or but faintly indicated. (Texas.) 110. **fractus**
44. Front claws of ♂ more perceptibly enlarged; eyes in ♂ separated by about $1\frac{3}{4}$ times the length of the basal antennal joint; 10th joint of antennae less than three times as long as wide; legs almost entirely yellow. (Arizona.) 111. **truncatus**
- Front claws of ♂ scarcely perceptibly enlarged 45
45. Elytral punctuation confused in baso-sutural region, elsewhere more or less distinctly striate.
- Baso-sutural region of confused punctuation rather small, pygidial yellow spots moderate to large.
- Eyes of ♂ separated by about $1\frac{1}{2}$ times the length of the basal antennal joint or slightly more, or by a distance scarcely or barely as great as the vertical width of their upper lobes; antennae more slender, the 10th joint more than three times as long as wide. (Arizona to Texas.) 112. **precarius**
- Eyes of ♂ separated by twice the length of the basal antennal joint, a distance distinctly greater than the width of their upper lobes; antennae a little less slender, the 10th joint (♂) not more than three times as long as wide. (Arizona.) 113. **nogalicus**
- Baso-sutural region of confused punctuation much more extended, the punctures more densely placed; prothorax and pygidium predominantly black, apical spots of the latter small or wanting. (New Mexico to Arizona.) 114. **croftus**
- Elytral punctuation confused as far as the submarginal stria, no well defined striae postero-laterally; size larger. (Arizona to Texas.) 115. **sonorensis**
46. Elytra without impressed striae, the punctures confusedly dispersed almost throughout. (Arizona.) 21. **insidiosus**
- Elytra with distinct striae at rear and sides; punctures confused in baso-sutural region.
- More robust, prothorax widest at basal $\frac{1}{3}$ or $\frac{2}{3}$, sides strongly rounded. (Texas.) 63. **brevicornis**
- Less robust, prothorax widest very near the base, sides slightly to moderately rounded.
- Lateral thoracic spot quadrate, solid or entire, not connected with the median stripe (rarely slightly so); elytral spots usually fused into two sharply outlined transverse fasciae connected along the suture, the humeral spots, however, often isolated. (Eastern United States.) 120. **tridens**
- Lateral thoracic spot more or less irregular or disintegrated exteriorly, often connected with the median stripe; elytral maculation more irregular, the standard spots all more or less distinct, though frequently confluent in part. (Eastern United States.) 121. **obsoletus**

47. Front with ocular lines.

Prothorax moderately narrowed in front. (New Mexico to Colorado.)

122. **alticola**

Prothorax transversely quadrate, scarcely narrowed in front; eyes slightly closer; elytral striae a little less impressed. (Arizona.)

111. **truncatus***

Front without ocular lines.

Eyes separated in the ♂ by twice the length of the basal antennal joint; size rather large (3.5 mm. or more).

Form less robust, prothorax feebly narrowed in front, side margins rather broadly impunctate, color predominantly black. (California.) 117. **lustrans***

Form very robust, prothorax moderately (*subvittatus*) to strongly (*instabilis*) narrowed in front, the side margin very narrowly or partially smooth.

Yellow, prothorax shorter, trivittate with black, the median vitta divided in front, legs pale. (Texas.) 126. **subvittatus**

Red or reddish yellow and black, thorax not trivittate, legs black. (Texas to Kansas.) 152. **instabilis***

Eyes separated in the ♂ by less than twice the length of the basal antennal joint.

Size large (3.5 to 5 mm.); elytral punctuation almost completely confused. (Colorado to Arizona.) 116. **varicolor***

Size much smaller (2.25 to 3.1 mm.); elytral striae evident.

Antennae less elongate, the 10th joint less than three times as long as wide in the ♂; elytral striae more regular. (Texas to California.) 123. **laevis**

Antennae more elongate, 10th joint four times as long as wide; elytral striae much broken; size generally larger. (Arizona.)

125. **conspirator***

Group D

(Species starred (*) are tabulated in more than one group.)

The species of this group are not very numerous, and are generally easily recognized. In the typically marked forms the elytra are yellow or testaceous with the suture and two vittae on each, black. The outer vitta is more subject to reduction or disintegration than the inner, and in *bivittatus* and allies is commonly interrupted to form three spots, one or more of which may be lacking (as in *bivittatus*), or the two vittae may be fused into a single broad stripe—as in *circumcinctus* and *consimilis*. In *sublimatus* the inner vitta also may be entirely lacking, in consequence of which it has been necessary to also tabulate the species in Group C. In *autolyceus* varieties *difficilis* and *wahsot-*

chensis the elytra are mostly black, and to lessen the chances of error these have been tabulated also in Group E.

1. Punctuation of elytra in great part confused. 2
 Punctuation of elytra arranged in tolerably regular series (less conspicuously so in *picturatus*) 4
2. Terminal spur of front tibia wanting or very rudimentary; last joint of maxillary palpi scarcely differing in the sexes; punctuation coarser and denser. 145. **viduatus**
 Terminal spur of front tibia normally developed; last joint of maxillary palpi more widely truncate in the ♂; punctuation finer and less dense. 3
3. Eyes in ♂ separated by a distance evidently less than twice the length of the basal antennal joint; elytra bivittate, the outer stripe rarely if ever continuous, and usually interrupted to form three spots, one or more of which may be lacking 128. **bivittatus**
 Eyes in ♂ separated by at least twice the length of the basal antennal joint.
 Elytra occasionally with a single narrow vitta, with or without faint traces of lateral spots, but usually entirely destitute of markings; submarginal stria much confused; eyes in ♂ separated by twice the length of the basal antennal joint, or a little more. 129. **sublimatus***
 Elytra each with a single broad discal vitta; eyes separated by from 2½ to 3 times the length of the basal antennal joint.
 Eyes in ♀ less widely separated than their own vertical length; the submarginal stria nearly regular. 130. **circumcinctus**
 Eyes in ♀ more widely separated than their own vertical length; submarginal stria more confused. 131. **consimilis**
4. Prothorax densely strigate punctate, a smooth median yellow line which does not reach the base 139. **othonus**
 Prothorax less densely, usually rather sparsely punctate, not strigose (rarely somewhat so towards the sides in some examples of *janus*) 5
5. Elytra yellow, with suture or sutural bead and two discal vittae on each black or brownish.
 Front claws of ♂ distinctly enlarged; lustre dull, outer elytral vitta confined to the 7th and 8th interspaces 135. **pawnee**
 Front claws of ♂ not enlarged.
 Head and prothorax with more or less evident alutaceous sculpture (very fine and visible only on the head and toward the sides of the prothorax in some examples of *autolyceus*).
 Prothorax strongly transverse, more closely punctate. (Plains west of Mississippi River to the Rocky Mts.) . . . 141. **autolyceus**
 Prothorax moderately transverse, more sparsely punctate, and always distinctly alutaceous. (Atlantic Coast.) . . . 132. **litigiosus**
 Integuments polished, alutaceous sculpture not present except occasionally very faintly on the head.
 Outer elytral vitta confined to the 7th and 8th interspaces; median pronotal stripe conspicuously V-shaped.
 Vittae black. 136. **vau**

Vittae more or less imperfect and usually brownish.

var. **imperfectus**

Outer elytral vitta beginning on the 7th and 8th interspaces, and ending on the 6th and 7th.

Median pronotal stripe narrowly V-shaped; size smaller (2.7 to 3.8 mm.) 134. **dubiosus**

Median pronotal stripe not V-shaped but merely dilated a little anteriorly, the dilated portion usually showing a very narrow more or less obscure paler median line; size larger (3.7 to 4.4 mm.) 133. **virgatus**

Elytra yellow with a single narrow, often imperfect or subobsolete median vitta; the shoulder knob and a posterior spot (representing an outer vitta) black 137. **umbraculatus**

Elytra yellow with a single straight sharply defined but narrow vitta and the shoulder knob black 144. **picturatus**

Elytra black, with a narrow subsutural vitta, an intrahumeral basal spot, and the lateral and apical margin yellow; legs rufo-testaceous.

141. **autolyceus** var. **difficilis***

Elytra black, with narrow subsutural vitta and external margin yellow; legs brownish black in great part 141. **autolyceus** var. **wahsatchensis***

Group E

(Starred species (*) are tabulated in more than one group)

Species wholly or in great part black, or if the pale areas are more extensive they are definitely arranged (*discoideus*, *marginatus*, *cruentus*, *dilatatus*, *subfasciatus*), not irregular and fragmentary as is typically the case in Group C. Occasionally in *stygius*, and more often in *luridus*, *lustrans* and *confusus*, the pale spots are larger or more numerous, for which reason the three last named species have been tabulated also in Group C.

1. Anterior tibiae without terminal spur; last joint of maxillary palpi nearly similar in the sexes; antennae nearly as long as the entire body in the ♂.

Black, prothorax with side margins, apical edge and three discal spots reddish yellow, legs entirely black 117. **trinotatus**

Similar, but with prothorax narrower, sides straighter; elytra usually with small scattered fulvous spots, even more densely but less coarsely punctate; legs with small yellow spots. 148. **pulvinatus**

Anterior tibiae with terminal spur, last joint of maxillary palpi more or less obviously more widely truncate at apex in the ♂; antennae less elongate 2

2. Pale areas or markings generally broader and definite in arrangement or design 3

Pale markings as a rule irregularly disposed, generally small and inconspicuous (much more extensive in some examples of *lustrans* and *luridus*); prothoracic markings, when present, consisting typically of a narrow median

- anterior, and two oblique basal spots, the lateral margin and a very narrow anterior margin, yellow9
3. Elytra with a narrow subsutural vitta—often interrupted—and the lateral and apical margins, yellow; prothorax with two basal spots and a median anterior spot or line, yellow.
 Legs almost entirely rufo-testaceous. (Maine; Michigan.)
 141. **autolyceus** var. **difficilis***
 Legs dark in great part. (Utah; Montana.)
 141. **autolyceus** var. **wahsatchensis***
- Elytra similarly marked, but with the sutural vitta and external margins obscure rufous and often almost completely obsolete; prothorax with at most only faint traces of markings142. **nigricornis**
 Elytra without sutural vitta4
4. Front claws of ♂ very strongly enlarged; black, prothorax red varying to black with red side margins.153. **hybridus**
 Front claws of ♂ not or scarcely enlarged (except *subfasciatus*, in which they are moderately so)5
5. Punctures of prothorax elongate laterally, with a distinct tendency toward strigosity; black with external margins of thorax and elytra pale yellow or yellowish white.140. **praeclarus**
 Prothorax normally punctured, pale areas of elytra red or reddish6
6. Side margins of prothorax yellowish white (rarely entirely black), head and legs often spotted with yellowish white; elytra orange red with a broad black sutural stripe not attaining the apex154. **discoideus**
 Side margins of prothorax never yellowish white, legs and usually the head entirely black, or virtually so.7
7. Prothorax with distinct entire smooth median line; prothorax and elytra with wide red border, which may become partially or completely interrupted at the elytral convexity155. **marginatus**
 Upper surface dull red, the prothorax with three small basal black spots; elytral disk sometimes cloudedvar. **sanguineus**
 Prothorax without distinct median smooth line.8
8. Prothorax entirely black, elytra with a broad red margin interrupted at the convexity156. **eruentus**
 Prothorax margined with red or reddish yellow.
 Elytra with a large subquadrate spot extending from the margin $\frac{2}{3}$ to suture, and apical spot, red.157. **dilatatus**
 Elytra with a broad irregular or indented median fascia, often interrupted at the suture, and apical spot, red.60. **subfasciatus**
9. Prothorax more or less strongly shining, either polished or finely alutaceous.10
 Prothorax alutaceous, lustre dull or but slightly shining15
10. Elytral punctuation confused, without trace of serial arrangement except in the imperfect submarginal stria116. **varicolor***
 Elytral punctures more or less obviously arranged in impressed lines laterally and posteriorly11
11. Size larger, more robust, pale markings red or reddish yellow.
 Prothoracic punctuation dense. (Texas.)152. **instabilis**
 Prothoracic punctuation sparse. (Arizona.)151. **vulnerosus**

- Size smaller and less robust, pale markings yellow. (Pacific Coast species.) 12
12. Front claws of ♂ very little or scarcely larger than the others 13
 Front claws of ♂ quite conspicuously enlarged. 14
13. Sides of prothorax narrowly smooth, yellow markings frequently conspicuous 117. **lustrans**
 Sides of prothorax closely punctured to the extreme margin, yellow markings almost wanting 82. **signatifrons***
14. Sides of prothorax distinctly smooth or subimpunctate along the margin, strongly rounded in both sexes; last ventral segment with yellow marks. 119. **pinguescens***
- Sides of prothorax closely punctate to the extreme margin, or with the punctation only very narrowly sparser when the margin is yellow; sides moderately to strongly rounded in the ♂, much less so in the ♀; last ventral segment always entirely black.
 Yellow markings few to many 118. **californicus***
- Yellow markings entirely lacking var. **gagatinus**
15. Front claws of ♂ small 16
 Front claws of ♂ obviously but not strongly enlarged 17
 Front claws of ♂ conspicuously enlarged 18
16. Entirely black or very nearly so.
 Punctures of prothorax nearly or quite as coarse, as those of the elytra; eyes of ♂ separated by barely twice the length of the basal antennal joint.
 Prothorax of ♂ without narrow smooth margin; form shorter; elytral striae better defined. (Florida.) 98. **stygius**
 Prothorax of ♂ with narrow smooth margin; form a little more elongate; elytral striae ill-defined. (Arizona.) 99. **lachrymosus**
 Punctures of prothorax distinctly finer than those of the elytra and more evenly distributed; eyes of ♂ separated by nearly three times the length of the basal antennal joint 143. **carbonarius**
 Black or fuscous, sometimes with few, but usually with numerous small yellow spots, at least on the elytra; eyes of ♂ separated by twice the length of the basal antennal joint or a little more. 95. **atomarius***
17. Size much smaller (not over 3 mm. in length); eyes of ♂ separated by fully twice the length of the basal antennal joint, the basal joint black or fuscous throughout. (Lower Mississippi Valley.) 96. **vestigialis***
- Size larger (3.4 to 4.3 mm.); eyes in ♂ separated by distinctly less than twice the length of the basal antennal joint. (Western Texas to Arizona.) 65. **wenzeli**
18. Eyes of ♂ separated by fully twice the length of the basal antennal joint. 119. **confusus***
- Eyes of ♂ separated by $1\frac{1}{2}$ times the length of the basal antennal joint, or less.
 Size smaller (about 3 mm.), front claws of ♂ less strongly enlarged. 61. **impurus** var. **umbrosus**
 Size larger, front claws of ♂ more strongly enlarged 150. **luridus**

Group F

The two species here segregated constitute the most natural of the groups into which I have separated our species. The group characters are as stated in the table and are easily appreciable. The species separate readily by their color.

Grayish or yellowish brown with a more or less distinct dark subapical sutural spot.....	158. hepaticus
Black, with scarcely a trace of paler marks.....	159. microps

1. **Pachybrachys pubescens** Olivier

Robust, black throughout, with sparse short grayish pubescence. Eyes small and distant. Ave. length 4.1 mm. Atlantic Coast Region.

Head closely to densely punctate throughout; eyes small, their distance apart obviously greater than their vertical length in the male, and fully one-half greater than their length in the female.

Prothorax about three-fifths wider than long, widest near the base, sides strongly convergent and nearly straight or feebly arcuate; punctuation rather coarse, close throughout, denser laterally, less dense toward the middle of the disk; a narrow more or less incomplete or imperfect smooth median line often present.

Elytra slightly longer than wide, punctuation usually distinctly coarser than that of the prothorax, close, evenly distributed, without trace of serial arrangement.

Length 3.4 to 4.8 mm.; width 2 to 2.8 mm.

Distribution.—Occurs from New York to South Carolina, usually at no great distance from the coast. The following localities are known to me or are authoritatively reported.

New York: Watkins, June 12 (Nat. Mus. Coll.). *Pennsylvania*: Water Gap. (Van Dyke Coll.). *New Jersey*: Ocean Co. (Leng); Cape May Co., V-28 (Wenzel); Atco, May 29; (Liebeck); Newtonville, June (Boerner); Clementon, May; Da Costa. *North Carolina*: Wilmington (Wenzel Coll.). *South Carolina*: In Hubbard and Schwarz and Liebeck Colls. without definite locality. *Ohio*: Cincinnati (Dury).

It may be remarked that this is the *morosus* Hald. of the Henshaw List. In the Henshaw Supplement the *viduatus* of Fab. has unaccountably been recorded as the equivalent of *pubescens* Oliv., two species which are totally unlike in general appearance.

2. **Pachybrachys haematodes** Suffrian

Very similar to *pubescens* and differing as follows:

Average size somewhat smaller, and scarcely as robust; pubescence longer and more conspicuous; prothorax slightly less transverse, less strongly narrowed in front, the sides more arcuately prominent behind the middle; punctuation of the elytra scarcely or but little coarser than that of the prothorax; upper surface, more often of the elytra, more or less variegated with diffuse rufous spots or markings.

Distribution.—Occurs in Texas, Colorado, New Mexico and Arizona. Described from Mexico. The following localities are represented before me.

Texas: Texas (Belfrage). *Colorado*: "Col" (Baker); Colorado Springs, along the creeks (Wickham). *New Mexico*: San Ignacio, June 27 (Cockerell); Clouderoft, June 14 (Knaus), May 22 (Viereck); Silver City (Dury); near Las Vegas Hot Springs, July (Snow). *Arizona*: Huachuca Mts., May 16 (Clemence); Palmerlee, July 27 (Wenzel); Chiricahua Mts., May 16 (Clemence).

While the characters given above would seem to be sufficient to separate *haematodes* from *pubescens*, they are I find all subject to variation and many examples are fairly intermediate between the typical forms; I am therefore not at all sure of their specific distinctness.

3. *Pachybrachys integratus* new species

Yellowish, thinly pubescent above, with broad suffused pale brown to fuscous markings; surface shining, without alutaceous sculpture; eyes narrowly separated. Ave. length 3.7 mm. California and Arizona.

Head closely and evenly punctate, an impressed line between the eyes; entirely pale, or with the impressed line and a small spot at base of antenna darker. Eyes large, separated in the male by a distance not greater than the length of the second antennal joint; in the female by rather less than the length of the first two joints. Antennae very slender throughout, subequal in length to half the body in the male, somewhat shorter in the female, entirely rufo-testaceous or with the outer joints darker.

Prothorax widest at or a little behind the middle, sides strongly arcuate, base a little wider than the apex; punctuation rather close, fairly regular, with scattered minute interstitial punctures, more obvious in the female; margins not smoother; markings diffuse.

Elytra parallel or slightly narrowed behind, sides moderately sinuate behind the humeri; punctures rather fine and confused in a small triangular scutellar region, the next two discal striae and the two outer ones well defined, the intermediate region confusedly punctured; the striae punctures moderate in size basally but finer toward the apex. The pubescence arises from a system of interstitial punctures which are barely visible basally but are gradually larger

toward the rear and outer margins, becoming apically slightly asperate and subequal in size to the stria punctures.

Pygillum, body beneath and legs nearly uniformly rufo-testaceous except in one male, in which the body beneath is black except the apical half of the last abdominal segment. Front tibiae distinctly nearly evenly arcuate, and feebly widened apically; terminal spur very small; hind tibiae with very slender spur; claws of front tarsi not appreciably larger.

Length 3 to 4.4 mm.; width 1.55 to 2.4 mm.

Distribution.—*California*: Colorado River, 1 ♀; Raymond, 1 ♂ (Fenyès); Kaweah, 1 ♀ (Hopping). *Arizona*: Hot Springs, 1 ♂, 2 ♀'s (Barber and Schwarz).

The type is the female from the Colorado River. The Raymond male differs in having the markings quite black, the body beneath also black; it is, however, undoubtedly identical with the Arizona male. The tabular characters easily differentiate this species from any other now known, but it should be borne in mind that the spur of the hind tibia is very slender and easily broken off—as indeed it seems to be in one of the specimens at hand. The eyes are more closely approximate than in any other of our pubescent species except *vigilans*, in which, however, they are in actual contact in the male.

4. *Pachybrachys connexus* new species

Not very robust, rufo-testaceous, elytra with subsutural and marginal black stripes, which are connected narrowly along the base and more broadly on the declivity; metasternum and abdomen in great part black; pubescence sparse and short, recurved on the prothorax, suberect on the elytra; integuments shining, without trace of alutaceous sculpture. Length 3.25 mm. Arizona.

Head clear rufo-testaceous without marks, rather coarsely closely punctate, front not impressed. Eyes in female separated by about two and one-half times the length of the rather small basal antennal joint. Antennae lacking except the two basal joints, which are entirely pale.

Prothorax rufo-testaceous, a little paler along the side margins, without spots, moderately transverse, widest at or a little before the basal third, sides rather strongly rounded, surface a little uneven, closely subevenly punctate throughout.

Elytra one-fourth wider than the prothorax, two-sevenths longer than wide, sides somewhat sinuate behind the humeri; punctures confused in a narrow sutural region to behind the middle, elsewhere arranged in nearly regular feebly impressed series; interstitial punctures moderately numerous and distinct though rather fine, forming more or less even single series on the narrower intervals. The color of the elytra may be described as flavate, the broad

discal black stripe confluent with the suture posteriorly, and so connected with the narrower marginal stripe as to leave an irregular antero-lateral spot and a smaller apical spot, pale.

Legs entirely rufotestaceous.

Length 3.25 mm.; width 2.25 mm.

Distribution.—The unique type is a female collected at Hot Springs, Arizona, June 27, by Barber and Schwarz and is in the National Museum Collection.

This species strikingly resembles in general form and sculpture *integratus*, but differs in coloration and in its much more widely separated eyes, and apparently in lacking the terminal spur of the hind tibiae; this spur, however, is very slender in *integratus* and may be easily broken off, so that it is not impossible that future specimens may show it to be present in *connexus*.

5. *Pachybrachys vigilans* new species

Pale yellowish testaceous with fuscous markings, surface moderately shining without alutaceous sculpture, thinly pubescent. Eyes contiguous in the male. Length, 3.5 mm. Lower California.

Head.—Front yellow without markings, closely evenly punctate. Antennae slender, attaining the middle of the elytra (male).

Prothorax moderately transverse, widest at about the basal two-fifths, sides strongly arcuate, apex three-fourths as wide as the base, rather densely punctate to the extreme margins, the punctures moderate in size, nearly evenly distributed but leaving a few scattered very small slightly elevated smooth areas; disk broadly transversely depressed basally and less obviously so across the apex, leaving the median portions rather strongly convex when viewed in profile. Thoracic M imperfect, consisting of a narrow median anteriorly divided stripe and an irregular lateral spot inclosing a pale area, none of the marks extending much in advance of the middle.

Elytra slightly narrowed posteriorly, sides sinuate behind the humeri, closely fairly evenly punctate throughout, the punctures forming one or two imperfect series at the middle of the disk, and again toward the side margins; a secondary system of very small sparse and inconspicuous or barely detectable interstitial punctures; color pale testaceous with fuscous markings as follows:—a postscutellar and a subapical sutural spot, the humeral knob and median and basal marginal spots, all quite irregular.

Beneath, body and legs entirely pale; front tibiae distinctly arcuate, rather feebly widened apically; claws small, subequal.

Length 3.5 mm.; width 1.8 mm.

Distribution.—*Lower California* (San Felipe)—a single male given me by Mr. Beyer.

In most respects this species is much like *integratus*, and it is not impossible that further specimens may prove the hind tibiae to be similarly armed with a slender terminal spur. It is the only species in our fauna, thus far known, with absolutely contiguous eyes.

6. ***Pachybrachys wickhami*** Bowditch

Form rather short and stout; black, not shining; pubescence dense, white, recumbent, nearly or quite concealing the sculpture of the head and prothorax, and obscuring that of the elytra; elytra luteous with black markings. Ave. length 3.1 mm. Arizona to Lower California.

Head very densely punctate, eyes more prominent than the anterior angles of the prothorax, separated in the male by barely twice the length of the basal antennal joint, slightly more distant in the female. Antennae (male) fully attaining the middle of the elytra, much shorter in the female, pale at base, outer joints more or less infusate.

Prothorax quite strongly transverse, sides feebly arcuate, base not much wider than the apex as a rule, surface throughout rather finely, excessively densely punctured and opaque.

Elytra dull luteous with the typical spots black, the inner ones more or less irregular and usually produced backward and inward to join the suture; all the spots variable in extent and sometimes much reduced or in part wanting; punctures moderately strong, irregular in the scutellar region, but forming some more or less regular but scarcely impressed series on the disk and laterally, the submarginal stria best defined and feebly impressed; secondary system of finer interstitial punctures bearing the pubescence quite dense and conspicuous over the entire surface.

Beneath, body black, pubescence rather dense; legs rarely almost entirely pale, the thighs usually more or less distinctly annulate with black—except the front ones, the tibiae blackish in apical half; front claws not appreciably enlarged in the male.

Length 2.8 to 3.5 mm.; width 1.5 to 2 mm.

Distribution.—*Arizona*: Tucson (Wickham), type; Hot Springs (Barber & Schwarz). *California*: Palm Springs (Fenyés). *Lower California*: Santa Rosa (Beyer).

7. ***Pachybrachys thoracicus*** Jacoby

Robust, black, prothorax at base and the raised basal margin of the elytra red; rather densely silvery white pubescent, especially the head, pygidium and under surface. Ave. length 4.3 mm. Arizona.

Head finely moderately closely punctate and dull, the sculpture nearly or quite concealed by the dense pubescence; eyes separated in the male by twice the length of the basal joint of the antennae; in the female by about two and a half times the length of the basal joint; antennae slender and rather more than half as long as the body in the male, shorter in the female, blackish, scarcely paler at base.

Prothorax subconical with sides broadly rounded, not quite one-half wider than long, widest immediately before the base, the latter one-half wider than the apex; surface somewhat shining, very minutely alutaceous, closely rather finely punctate, with still finer interstitial punctures; red basal margin wider laterally, involving fully one-half of the side margins.

Elytra not at all or scarcely wider at base than the prothorax, very slightly longer than wide, a little narrowed behind; surface alutaceous, dull; coarser punctures serially or subserially arranged in great part except in the scutellar region; interstitial punctures moderately numerous but very small and inconspicuous.

Beneath very densely pubescent; legs rather stout, middle and hind thighs pale at extreme base; front claws not appreciably enlarged in the male.

Length 3.7 to 5 mm.; width 2 to 2.7 mm.

Distribution.—*Arizona*: Bill Williams' Fork (Snow); Hot Springs, June 24-27 (Barber and Schwarz); Williams, June (Wenzel). Described from Chihuahua (Pinos Altos), Mexico.

The large size, dense recumbent pubescence and color, render this species instantly recognizable.

8. ***Pachybrachys analis*** LeConte

Moderately robust, with sparse semi-erect pubescence. Prothorax shining, with narrow smooth median line. Elytra more or less densely subrugose punctate, less shining. Black, sides of prothorax, lateral margins of elytra at base, and apex of elytra testaceous; disk of prothorax and elytra either entirely black, or more often variegated with testaceous. Ave. length 3.75 mm. Utah to Lower California.

Head black or variegated with testaceous, front more or less longitudinally impressed, punctuation rather dense and evenly distributed. Eyes remote, separated in the male by a distance subequal to the length of the basal four joints of the antennae or rather less than their own vertical length; in the female by more than the vertical length. Antennae (male) moderately slender, reaching the basal third of the elytra, the outer joints fully twice as long as wide; in female not passing the humeri, outer joints scarcely twice as long as wide.

Prothorax rather long, one-fourth to two-fifths wider than long, more transverse in the female as usual, apex seven-tenths as wide as the base, sides moderately rounded, subparallel in basal half or less, especially in the male;

surface polished, densely rather finely punctate, the median line narrowly smooth or sparsely punctate; disk sometimes entirely black, more commonly with two basal spots and a narrow apical median vitta yellow.

Elytra slightly longer than wide, sides parallel, punctuation dense and more or less rugose, coarser punctures in part serially arranged, one or two lateral and two discal intervals usually feebly costiform; finer interstitial punctures numerous, most evident toward the elytral apex.

Beneath black, apical part of last ventral segment pale; legs bicolored; front claws of ♂ scarcely larger.

Length 3 to 4.5 mm., width 1.7 to 2.4 mm.

Distribution.—*California*: San Diego, May; Arrowhead Springs, May 31; Mokelumne Hill (Blaisdell); Sobre Vista, Sonoma Co., July, Shasta Co., and Marin Co. (Van Dyke); Mt. Breckenridge, Kern Co., June 6, (F. Grinnell). Many specimens, including the LeConte type, are labeled simply "Cal." *Nevada*: Reno (Wickham); Las Vegas (Spaulding). *Utah*: American Fork, June 24, (Hubbard & Schwarz). *Arizona*: Catalina Springs (Hubbard & Schwarz); not quite typical and doubtfully referred. *Lower California*: Ensenada (Beyer).

A rather widely dispersed species in the Southwest, and showing a good deal of variability in the extent of the pale markings. The prevailing color is nearly always black, but a few specimens have the elytra in great part testaceous and less densely and roughly punctured; these bear a strong resemblance to *marmoratus* Jac., in which, however, the prothorax is more conical in form. In what I take to be the typical form the prothorax is almost devoid of fine interstitial punctuation, but in other examples these are quite evident, and intermediates are not wanting. There is also noticeable some variation in the width of the front between the eyes.

9. **Pachybrachys desertus** new species

Very similar in size, form, sculpture and pubescence to *analis*; color entirely rufo-testaceous, the body beneath blackish in some males.

Head with the standard spots brown or fuscous, upper surface with faint rufous or livid clouds representing the prothoracic M, and occasionally with faint diffuse traces of one or more of the standard elytral spots.

Prothorax not very strongly narrowed toward the front, the sides as a rule more evenly rounded than in *analis*, the punctuation always intermixed, the finer punctures less fine than in those specimens of *analis* in which they occur; legs rufo-testaceous.

Length 3 to 4.5 mm.

Distribution.—*California*: Mojave (Wickham), June 1 (Fenyès), type ♂; Old Beach, Colorado Desert, April; San Bernardino Co., San Diego Co. (Co-

quillet); Inyo Mts., 7,000-9,000 feet (Wickham). *Arizona*: two examples without definite locality referred here with some doubt.

In color *desertus* resembles *xanti* quite closely, but the latter is more robust, thorax more conical in form, elytral intervals wider with more numerous interstitial punctures. Its affinity with *analis* is, however, more marked as indicated above, and, as in *analis* , there exists an unusual instability in the degree of separation of the eyes, which as a rule are rather closer in the present species.

10. *Pachybrachys xanti* Crotch

Very robust, rufo-testaceous, prothorax unusually long, subconical with smooth median line, with or without faint darker shades; metasternum more or less infuscate; pubescence short, sparse, inclined. Average length 4.3 mm. Texas to Utah and Southern California.

Head rather closely evenly punctate, frontal spots vague to fairly distinct, surface shining, scarcely visibly alutaceous. Eyes separated in the male by twice the length of the basal antennal joint or slightly more, in the female by three times the length of the basal joint, or by about the length of the basal four joints. Antennae extending a little beyond the humeri in the male, scarcely attaining the hind angles of the thorax in the female, pale throughout, or with the outer joints dusky.

Prothorax unusually long, subconical, widest at base, sides nearly straight or but slightly curved, usually perceptibly sinuate before the hind angles; surface polished, densely nearly evenly punctate with very narrow entire or subentire smooth median line; punctures not very coarse, of nearly equal size, less dense along the side margins, minute interstitial punctures nearly wanting.

Elytra a little wider than the prothorax, very little longer than wide, obviously narrowed from the humeri to the apex; surface finely alutaceous, dull, coarser punctures forming fairly regular but not or but feebly impressed series; intervals wide, rather densely confusedly punctate, these latter punctures nearly as coarse on the disk as those of the striae series.

Beneath body punctured and pubescent as usual; legs rather stout; front claws of male not enlarged.

Length 3.5 to 4.8 mm.; width 2.2 to 2.8 mm.

Distribution.—*Lower California*: type, collected by Xantus. *California*: Jacumba, San Diego Co., July 1 (Field). *Arizona*: Bill Williams Fork and "Cactus Plain" (Snow); Phoenix, feeding on *Atriplex*, June 8, (H. B. Shaw); Hot Springs, June 27 (Barber & Schwarz); "Ari" numerous collections. *Utah*: St. George, July (Wickham). *Texas*: El Paso (Wickham; Barber and Schwarz).

11. *Pachybrachys marmoratus* Jacoby

Very similar to *xanti* in nearly all respects, the differences being as follows: Size a trifle smaller on the average, with the form rather less robust; color pale

flavo-testaceous, frontal and thoracic markings black and heavy as a rule, the latter varying to pale brown; antennae with basal two joints blackish above, three to five mostly pale, following joints blackish; body beneath frequently blackish in great part, but variable; elytra varying from entirely pale to strongly marked with fuscous or black, the markings tending to form diffuse vittae following the lines of serial punctures; interstitial punctuation of elytra somewhat finer and less dense than in *xanti*.

Length 2.9 to 4.2 mm.; width 1.6 to 2.5 mm.

Distribution.—*Texas*: El Paso, June 7 (Knaus); Davis Mts., July 7 to 10 (Wenzel). *Colorado*: one example without definite locality (C. F. Baker). *New Mexico*: Alamogordo, Apr. 23, May 10, (Viereck). *Arizona*: Riverside (Wickham); Globe (Wickham); Nogales, Aug. 10 to 13 (Wickham); Phoenix, May 16; Hot Springs, June 28 (Barber & Schwarz).

12. *Pachybrachys donneri* Crotch

Black, opaque, side margins of prothorax, basal raised margin of elytra also side margins for a variable distance from the base, yellow; lustre throughout alutaceous; pubescence gray, decumbent, rather plentiful; disk of elytra and prothorax sometimes feebly and indefinitely irrorate with dull yellow. Ave. length 4.5 mm. California and Washington.

Head black, often with small yellow markings, thickly punctate, feebly impressed. Eyes in male separated by a little less than three times the length of the basal antennal joint, or by a little less than their own vertical length; in the female by about three and one-half times the length of the basal joint, or rather more than their own vertical length. Antennae attaining the humeri in the female, considerably longer in the male, more or less pale basally, black beyond the middle.

Prothorax moderately transverse, widest at base, sides arcuate, very slightly sinuate before the hind angles; rather densely moderately coarsely punctate with intermixed finer punctures; no trace of smooth median line; yellow side margin more sparsely punctate.

Elytra abruptly a little wider than the prothorax, one-fourth longer than wide, sides feebly sinuate, punctures for the most part irregularly dispersed but with some nearly regular series especially at sides; interstitial punctures very fine but moderately numerous.

Pygidium black, the sides sometimes narrowly yellow. Legs entirely black or with the tips of the thighs pale.

Length 3.75 to 4.9 mm.; width 2 to 2.6 mm.

Distribution.—*California*: East end of Donner Lake on willows (type, Crotch); Yreka; Santa Rosa (Ricksecker); Blair's Ranch, Redwood Creek, Humboldt Co., June 9 (H. S. Barber); Sonoma Co. (Van Dyke). *Washington*: Olympia, May 20 (Liebeck Coll.).

13. *Pachybrachys uteanus* new species

Very closely allied to *donneri* and perhaps merely a geographical race of that species; the eyes, however, are in all specimens seen less widely separated and the thoracic punctuation uniformly finer; the upper surface also more often variegated with yellow. These latter specimens look greatly like the darker examples of *brunneus* and really form a good connecting link between *donneri* and typical *brunneus*; they are, however, quite surely distinct from the latter.

Distribution.—*Utah*: American Fork, June 24 (Hubbard & Schwarz); type ♂. *New Mexico*: Pecos (Cockerell).

14. *Pachybrachys brunneus* Bowditch

Form narrower than usual in this section, testaceous with pale brown punctures, the thoracic M indicated by faint brownish clouds, which occasionally become fuscous or black and involve the whole disk except narrow side margins; elytra frequently with diffuse shades which, as on the thorax, tend to become darker and spread broadly over the disk; surface finely alutaceous, lustre dull, pubescence rather plentiful, short, decumbent. Ave. length 3.6 mm. Texas to Southern California.

Head not very thickly punctate, vertex impressed, markings faint to distinct. Eyes (in the male) separated by one and one-half times the length of the basal joint of the antennae or by rather less than the vertical width of their upper lobes; in the female by a little more than twice the length of the basal joint. Antennae thin, attaining the humeri in the female and fully the basal third of the elytra in the male, the outer joints more than twice as long as wide.

Prothorax subconical, not very strongly transverse, sides convergent from the base, nearly straight in the male, broadly curved in the female, punctuation moderately close, not very coarse, with finer punctures intermixed; no trace of smooth median line.

Elytra a little wider at base than the prothorax, one-fourth longer than wide, slightly sinuate behind the humeri and feebly narrowed posteriorly; punctuation rather fine and irregular but with the submarginal and usually some discal series more or less well marked, not or scarcely impressed. In some specimens—more often females—two or three narrow discal smooth lines extend from the base backward becoming gradually lost posteriorly. Interstitial punctures fine, moderately numerous, most evident in the darker specimens.

Body beneath variable from entirely pale to almost completely infuscate. Legs in the darker specimens broadly dark ringed; front tibiae straight, claws subequal on all feet.

Length. 3 to 4.25 mm.; width 1.5 to 2.3 mm.

Distribution.—*Arizona*: Phoenix and Prescott—type series (Bowditch); Phoenix, June 4 (Wickham Coll.); Bill Williams' Fork, August (Snow); Tucson (Am. Ent. Soc. Coll.); Tucson, Tempe and Verde River (Liebeck Coll.); "Ari" many collections. *California*: S. E. Desert Region (Am. Ent. Soc. Coll.). *New Mexico*: N. Mex. (Snow) bearing label *xanti*. *Colorado*: (Baker). *Texas*: Davis Mts. (Wenzel).

15. **Pachybrachys purus** new species

Subcylindric, rather strongly convex, pale yellowish testaceous, feebly shining, integuments very minutely alutaceous, virtually immaculate, the thoracic markings pale brownish, diffuse and barely detectable; elytral punctures pale brown, those of the prothorax much finer and scarcely or but little darker than the surrounding surface. Ave. length 4 mm. Colorado River.

Head moderately punctate, more closely on the vertex and in a triangular frontal area, spots faint. Eyes separated in the male by a distance subequal to the vertical width of their upper lobes, or by about one and three-fourths times the length of the basal joint of the antennae; in the female by two and one-half times the length of the basal antennal joint; ocular lines distinct and at rather less than one-fourth the distance from the eye to the median line. Antennae attaining the hind coxae in the male, or the humeri in the female, terminal joint and apices of several of the outer joints dusky.

Prothorax moderately transverse, sides convergent from base to apex, more feebly so in basal fifth, feebly arcuate; surface finely not very closely nearly evenly punctate, with a few minute interstitial punctures; side margins narrowly smooth, the median line sometimes imperfectly so.

Elytra not (♀) or just perceptibly (♂) wider at base than the prothorax, slightly narrowed posteriorly; punctures not very coarse, striae not impressed, apical portion of the first and second, and the seventh and eighth throughout regular, otherwise striae much confused, though variably so; scutellar area rather closely confusedly punctured; marginal interspace wide, impunctate; submarginal interspace narrower but nearly even throughout.

Body beneath entirely pale; legs pale, femoral clouds very faint.

Length 3.5 to 4.5 mm; width 1.75 to 2.5 mm.

Distribution.—Occurs along the Lower Colorado River in California and Arizona. Three examples only are before me, the type a female collected by myself at Yuma, Cal., July 3; a male collected by Dr. Fenyes at Yuma, Apr. 22, and a female taken by Professor Wickham at East Bridge, Ariz., Aug. 21 (Leng. Coll.).

This is a very neat and pretty species, easily separable from all others by the tabular characters. The front claws in the male are noticeably a little larger than the others but not conspicuously so.

16. **Pachybrachys mellitus** Bowditch

Robust, dark honey yellow, immaculate, integuments very minutely alutaceous but rather strongly shining, punctures not or scarcely darker; eyes rather distant, ocular lines fine and quite

near the eyes; front claws of male not evidently enlarged. Ave. length 3.7 mm. Western Texas to California.

Head thickly punctate in the frontal marks, which are broad, faint and ill defined. Eyes prominent, separated by twice (σ^7) or three times (φ) the length of the basal antennal joint. Antennae short, barely reaching the humeri in the female and not passing the middle of the metasternum in the male; outer joints blackish.

Prothorax moderately transverse, not much narrowed in front, sides slightly incurved at base, surface coarsely somewhat unevenly punctate, with scattered minute interstitial punctures, a narrow incomplete smooth median line sometimes present.

Elytra nearly parallel, punctuation broadly confused on the disk, the two outer striae entire and distinctly impressed, the interior ones distinct only posteriorly, gradually shorter and less impressed toward the suture, interstices minutely punctulate, elytral shield wanting or very small; submarginal stria with a strong sigmoid flexure behind the humerus; marginal interspace more or less punctate.

Body beneath yellow with the metasternum and abdomen, except the margins, more or less rufo-testaceous or pale brown. Legs yellow with diffuse darker shades at middle of femora.

Length 3.2 to 4.2 mm; width 1.65 to 2.3 mm.

Distribution.—*Texas*: without definite locality (Beyer Coll.); El Paso. *Arizona*: Tucson, Dec. 14 (Hubbard), July 13-15 (Wickham); Phoenix; Florence, Aug. 10 (Biederman); Bill Williams Fork, Aug. (Eugene Smyth). *Utah*: St. George, July (Wickham). *California*: Palm Springs, Feb. 14 (Hubbard); Olancho, June (Fenyès); Needles (Wickham). Bowditch also gives Mojave, Inyo Mts. and Darwin—all collected by Wickham.

17. ***Pachybrachys xantholucens*** new species

Very similar in form, size and color to *mellitus*, differing as follows: Color a slightly deeper yellow as a rule, with, in most specimens, faint traces of the basal portions of the thoracic M; upper surface polished throughout, without trace of minute alutaceous sculpture; front without ocular lines, the supra-orbital groove being strictly marginal throughout; eyes more distant, separated by about two and one-half times (σ^7) or 4 times (φ) the length of the basal antennal joint, the distance in the latter sex being as great or slightly greater than the vertical length of the eye. Elytral striae more regular than in *mellitus*, punctures much sparser and more nearly serial in the scutellar area; second elytral interspace wide in posterior half; marginal interspace nearly or quite impunctate.

Length 2.6 to 4 mm; width 1.4 to 2.35 mm.

Distribution.—*Texas*: El Paso (type σ^7); "Texas" (Horn Coll.), Wickham; Chisos Mts., July 16 (Wenzel). *New Mexico*: Alamogordo, Apr. 29 (Viereck).

18. ***Pachybrachys jacobyi*** Bowditch

Moderately robust, pale whitish or grayish yellow, thickly, finely and for the most part diffusely punctate, the punctures

often pale brown but sometimes without color, integuments shining, not at all or scarcely alutaceous; eyes distant in both sexes; ocular lines present; front claws of male not enlarged. Ave. length 3.5 mm. Texas to Colorado and California.

Head rather closely punctate except in front and near the eyes, frontal marks wanting or with only the impressed line darker and faint traces of a vertical spot; ocular lines distinct, one-third to one-fourth the distance from the eye to the median line, blackish above, becoming colorless and fine between the eyes, evanescent inferiorly. Eyes small but somewhat prominent, in the male separated by the vertical length of the eye or about three times the length of the basal antennal joint; in the female by about three and one-half times the length of the basal joint. Antennae blackish apically, attaining the hind coxae in the male and the middle of the metasternum in the female.

Prothorax not strongly transverse, about one-third wider than long, sides broadly arcuate, feebly narrowed in front, surface rather closely, subevenly, not coarsely punctate, side margins smoother.

Elytra one-sixth to one-fifth wider than the prothorax, sides parallel, punctuation confused, sometimes arranged toward the rear and sides in unimpressed lines of greater or less length; the elytral shield sometimes indicated but usually not.

Body beneath entirely pale or with the metasternum and abdomen more or less blackish. Legs pale.

Length 3 to 4 mm; width 1.5 to 2 mm.

Distribution.—*California*: Amadee, July 21; Bridgeport; Indio, Aug. 19 (all collected by Wickham); San Diego Co. (Coquillett); Brawley, May 2. *Arizona*: Phoenix (Am. Ent. Soc. Coll.); Cottonia, Apr. 18; Bright Angel, July 5; "Ariz" (Morrison); Winslow (Wickham); Seligman, July 30 (Wickham). *Utah*: St. George, July (Wickham); South Creek, Beaver Co., June 22 (Schäfer Coll). *New Mexico*: Coolidge (Hubbard & Schwarz Coll.); Bernalillo Co. (Leng Coll.). *Colorado*: Grand Junction (H. Osborn); "Col" (Am. Ent. Soc. Coll.); La Junta (var. fide Bowditch). *Texas*: without specific locality.

There is in this species very little sexual difference in the form of the terminal joint of the maxillary palpus, this being nearly as pointed in the male as in the female. A considerable amount of variation in elytral punctuation is observable in the series at hand. According to Bowditch the La Junta, Colorado, specimens (which I have not seen) are much more coarsely punctate, almost scabrous in some females; these he considered to have no more than varietal standing. In a Bridgeport, California, female there is a very indefinite M on the thorax and the standard outside elytral spots are faintly indicated (fide Bowditch).

Specimens of this species from N. Sonora, Mexico, collected by Morrison and bearing the label "P. livens Lee., Jacoby det." have recently been sent to me from the British Museum. These

are doubtless some of the Mexican specimens recorded as *livens* in the Biologia.

19. ***Pachybrachys densus*** Bowditch

Small, above pale testaceous or dirty yellow, very thickly finely diffusely punctate, scarcely shining; eyes moderately distant, ocular lines distinct, front claws of male not enlarged. Ave. length 2.1 mm. Arizona and southeastern California.

Head closely punctate as a rule, but varying considerably, frontal marks vague or nearly wanting. Eyes a little more prominent than the front angles of the prothorax, separated in the male by twice, and in the female by two and one-half times the length of the basal antennal joint. Antennae attaining the middle of the elytra in the male, about the middle of the humeral lobe in the female, dusky toward the tip.

Prothorax moderately transverse, very little narrowed in front, sides feebly arcuate to nearly straight, disk without or with at most faint traces of basal marks; punctuation dense, but a little uneven, extending nearly or quite to the side margins.

Elytra more or less densely, diffusely punctate throughout, sometimes with one or two lines of punctures defined at sides, while two or three narrower intervals may be traceable on the disk in some examples—usually females.

Body beneath black except for the side and apical margins. Legs pale, usually with darker clouds at the middle of the femora and tibiae—more often the four posterior ones.

Length 1.8 to 2.5 mm; width 1.1 to 1.45 mm.

Distribution.—*Arizona*: Tucson (Am. Ent. Soc. Coll.), (Liebeck Coll.); Bill Williams Fork (Snow Coll.); also many specimens from "Ariz" in Nat. Mus. Coll. (Morrison), Horn Coll., Leng Coll. etc. A variety (?) in the Nat. Mus. Coll. (Hubbard & Schwarz) was taken at Catalina Springs, May 7. *California*: Needles (Wickham).

An easily recognized species by its small size, dull dingy yellow color and dense diffuse punctuation.

20. ***Pachybrachys immaculatus*** Jacoby

Rather robust, pale dull yellow above with brown punctures, finely alutaceous, scarcely shining; prothoracic markings pale, diffuse and nearly obsolete; elytra immaculate, rarely with faint traces of standard spots; ocular lines fine and near the eyes; the latter moderately distant; front claws of male not enlarged. Ave. length 2.8 mm. Texas to Arizona.

Head rather small, moderately closely punctate, frontal spots nearly wanting. Eyes not prominent, separated by about two (♂) to two and one-half (♀) times the length of the basal antennal joint. Antennae pale basally, dusky toward the apex, reaching about the middle of the elytra in the male, somewhat shorter in the female.

Prothorax not strongly transverse, sides broadly arcuately convergent from near the base, punctuation close and nearly uniformly dispersed, side margins narrowly smooth.

Elytra a little less than twice as long as the prothorax, rather finely confusedly punctate or with subregular close set short lines of punctures between the base and the conspicuous elytral shield; externally with a variable number of unimpressed striae, marginal interspace usually with a few punctures near the base, more rarely extending to or behind the middle. Pygidium yellow, scarcely maculate basally.

Body beneath brown or fuscous except the side and apical abdominal margins. Legs pale, femora with diffuse brown median spot, tibiae feebly brownish apically.

Length 2.3 to 3.3 mm.; width 1.35 to 1.8 mm.

Distribution.—*Texas*: Lee Co. (Leng Coll.); Dimmit Co. (Hubbard & Schwarz); "Tex" (Horn Coll.); San Diego, May 6 and June 13; Corpus Christi; Brownsville, May and June (Nat. Mus. Coll.); Brownsville, July (Beyer), July 28 (Schaeffer). *New Mexico*: Colorado, July 10 (Cockerell). *Arizona*: Santa Rita Mts., 5000–8000 ft., July (Snow); San Bernardino Ranch, Cochise Co., 3750 ft. (Snow and E. G. Smyth); Nogales, 4000 ft., Aug. 19 (Nunemacher); Chiricahua Mts., June 1 (Nat. Mus. Coll.); Florence (Horn Coll.), May 8, and Aug. 10 (Am. Ent. Soc. Coll.); Tucson (Liebeck Coll.).

This appears to be a common species along our southern border. It has been identified as *immaculatus* by Bowditch, doubtless from comparison with authentic examples, and the description seems to fit well enough. It was described from near the City of Mexico (H. H. Smith) and from La Paroda (Sallé).

21. *Pachybrachys insidiosus* new species.

Pale grayish yellow, feebly and obscurely maculate with brown; thickly rather finely almost entirely confusedly brown punctate, integuments very finely alutaceous; eyes widely separated; front with ocular lines; front claws of male not appreciably enlarged. Length 2.9 mm. Arizona.

Head thickly nearly uniformly punctate, markings obsolete. Eyes separated in the male by a distance almost as great as their vertical length, or by about three times the length of the basal antennal joint; in the female by a distance somewhat greater than their vertical length or by about three and one-half times the length of the basal antennal joint. Antennae dusky, paler basally, scarcely half the length of the body in either sex, tenth joint but little more than twice as long as wide.

Prothorax moderately transverse, sides broadly arcuate and moderately convergent from near the base; punctuation close, nearly evenly distributed, narrowly sparser along the side margins, the latter smooth for a short distance basally, the M vaguely represented by brownish clouds.

Elytral punctuation diffuse, with only a few short fragments of unimpressed

striae on the convexity, and with the submarginal striae in part defined; a lateral series of three small faint darker spots, and vague traces of small discal clouds; shield small but distinct.

Pygidium entirely pale; body beneath brown, the abdomen with pale margins. Legs testaceous, middle and hind thighs with diffuse dark rings.

Length 2.9 mm.; width 1.75 mm.

Distribution.—*Arizona*: Tempe, Mar. 28. The type is a female example sent by Professor Cockerell, and reported as having occurred on date palm. A male from "Ari" is quite surely identical.

This species is very similar to *immaculatus* in most respects but the latter rarely shows any traces of elytral spots, the basal antennal joint is larger and there are several well defined unimpressed lateral striae. In general aspect *insidiosus* is also not unlike some examples of *hepaticus* but the resemblance is purely superficial, *insidiosus* being a perfectly normal *Pachybrachys* in all essential respects.

22. *Pachybrachys marginipennis* Bowditch

Yellow, surface finely alutaceous and scarcely or at most only moderately shining; head and prothorax with the standard marks represented by diffuse pale reddish brown clouds, elytra immaculate with sutural and lateral edge very narrowly black; ocular lines present, rather close to the eyes; front claws of male rather strongly enlarged. Ave. length 2.75 mm. Southern California.

Head closely brown punctate, more densely so in the darker areas as usual. Eyes as a rule separated by about one and one-half times the length of the basal antennal joint, and by twice the length of the basal joint in the female. Antennae long, fully reaching the hind coxae in the female, and the middle of the abdomen in the male, outer joints dusky or blackish, basal three joints more or less blackish above, pale below.

Prothorax moderately transverse, sides broadly but somewhat angularly rounded at basal fourth, whence they are slightly arcuate and convergent to the apex, less obviously so to base, with a small sinuation before the sharply defined basal angles; punctuation moderately close, a little uneven in distribution, sparse or narrowly wanting along the side margins.

Elytra about twice as long as the prothorax, one-third longer than wide, parallel sides barely perceptibly sinuate, punctures very nearly equal in size and density to those of the prothorax, largely diffuse but often arranged in lines toward the sides and on the convexity, the marginal inter-space punctate throughout. *Pygidium* black and yellow.

Body beneath sometimes entirely yellow, but usually with the metasternum and abdomen in part black. Legs pale throughout or the femora and tibiae with diffuse median clouds.

Length 2.5 to 3 mm.; width 1.35 to 1.65 mm.

Distribution.—*California*: San Diego, May 1 to June 1; Los Angeles Co. (Coquillett in Nat. Mus. Coll.); Pasadena. Type from San Diego (Bowditch Coll.).

There is very little variation in color of upper surface in this species, but a considerable amount in punctuation of the elytra. In some specimens the diffusion is almost complete, but in most examples the submarginal (eighth) stria is fairly regular, as are often the seventh and the terminal portions of others, no two specimens, however, being quite alike. The punctures of the marginal interspace are variable in number, but extend throughout its length and are scarcely different in size from those of the submarginal stria, with which they are often confused.

23. ***Pachybrachys punctatus*** Bowditch.

Flavo- to rufo-testaceous, finely alutaceous and moderately or feebly shining; frontal marks small, prothorax with faint diffuse livid or pale brown clouds, elytra either immaculate or with some or all of the standard spots indicated, punctures brown, largely diffuse, sutural edge blackish; ocular lines fine, usually quite close to the eyes; front claws of male distinctly enlarged. Ave. length 3.2 mm. California.

Head moderately, but unevenly punctate; eyes not prominent, separated by from rather less than one and one-half to about one and three-fourths times the length of the basal antennal joint in the male and by a little more than twice the basal joint in the female. Antennae very slender, attaining or slightly passing the middle of the elytra in the male, shorter in the female, yellow basally, dusky beyond the middle.

Prothorax not very strongly transverse in the male, moderately so in the female, sides narrowed in front, broadly subangulate posteriorly and a little convergent before the basal angles; not very thickly, somewhat unevenly punctate, side margins narrowly smoother.

Elytra broadly diffusely punctate on the disk, one or two of the lateral striae more or less distinct—especially in the male—but scarcely at all impressed, the punctures also becoming subserial on the declivity; marginal interspace punctured throughout its length as a rule (rarely with but few punctures), and in the female the punctures are usually confused with those of the submarginal stria; elytral shield wanting or but faintly indicated.

Pygidium pale, the base, from which projects a median spur, and a small spot each side blackish.

Body beneath varying from entirely pale to almost entirely blackish. Legs pale, the hind femora often with small median spot.

Length 2.8 to 3.6 mm.; width 1.1 to 1.9 mm.

Distribution.—Widely diffused in California. The type locality is San Bernardino Mts. Bowditch also gives Independence. The following localities are represented before me: San Bernardino Mts., 5000 ft., July 12; Los Gatos (Hubbard & Schwarz); Santa Cruz Mts. Nat. Mus. Coll.; Santa Cruz, June (Nunenmacher); Vine Hill, Contra Costa Co., July 7; Blissdell; Burlingame, San Mateo Co., July 10; Fairfax, Marin Co., July 2, and Sabre Vista, Sonoma Co., July 11 (Van Dyke); Bartlett Springs, June (Fenyes); Yreka (Am. Ent. Soc. Coll.); Santa Catalina Island, July 30 and Aug. 21.

Var. **shasta** Bowditch

The type of this supposed species represents only an extreme form of *punctatus*, in which the elytral spots are well developed. I have precisely similar specimens from northern California and these are connected gradually with typical *punctatus* in my own collection, and seemingly in Bowditch's collection judging from his description, although he did not recognize the relationship. He mentions only females in his description, and in my experience it is only in this sex that the spots are completely developed. In the most conspicuously marked examples the rear spots coalesce into an irregular transverse band, and also unite with the middle interior spot.

Specimens are known to me from Castle Crag (type locality—coll. by Fenyes); McCloud, June (Fenyes); Marin Co. (Van Dyke's and my own collection).

Aside from the rather extreme variation in markings from immaculate in some *punctatus* to completely maculate in typical *shasta*, this species is also more variable than usual in some other respects, more especially in the width of the front between the eyes, and in the punctuation at the sides of the elytra. Bowditch describes this from one male and seven females. I have seen the single male, which is marked "type," but have seen none of the females of the type series; I have, however, before me a female from the type region—San Bernardino Mts.—labeled *punctatus* in Bowditch's handwriting and upon it I am depending largely for my conception of the species. *Punctatus* is very closely allied to both *arizonensis* and *marginipennis*; indeed I have seen an example of the latter labeled *punctatus* by Bowditch; as yet, however, I have seen no indication whatever of elytral markings in either *arizonensis* or *marginipennis* and the tabular characters may perhaps prove to be quite reliable.

24. **Pachybrachys convictus** new species

Rufo-testaceous, finely alutaceous, lustre dull; prothorax with small pale brown spots representing the basal parts of the standard M; elytra immaculate, more rarely with the standard spots more or less developed; ocular lines present but not very conspicuous and quite close to the eyes; front claws of male much enlarged. Ave. length 3.25 mm. California.

Head moderately punctate; eyes not prominent, separated in the male by one and one-half times the length of the basal antennal joint, or by a distance a trifle greater than the length of the first two joints; in the female by barely twice the length of the basal joint. Antennae passing the middle of the elytra in the male and attaining the basal third in the female.

Prothorax moderately transverse, sides quite strongly rounded behind the middle, punctuation moderately strong and close, leaving scattered small smooth areas which are a little more elevated.

Elytral striae more or less impressed in the male, irregular but fairly continuous except in the baso-sutural triangle, the fifth and sixth striae much broken or confused at middle. In the female the punctuation is more confused, with three more or less clearly defined intervals, the marginal interval more numerous punctate and the submarginal stria more confused than in the male, as is frequently the case in other species; shield small but evident.

Body beneath blackish in great part; legs pale, the femora scarcely or feebly clouded at middle.

Length 3.1 to 3.4 mm.; width 1.6 to 1.75 mm.

Distribution.—*California*: Folsom, Aug. 7 (Nat. Mus. Coll.) type; Sacramento Co., July. Several specimens collected by Coquillett in Los Angeles Co. are a little smaller (2.8 to 3 mm.) with darker punctures; these look a little different from the typical form, but a search for characters fails to reveal a sufficient basis for a distinctive name.

25. **Pachybrachys arizonensis** Bowditch

Cylindrical, light yellow or pale rufo-testaceous, pale brown punctate, minutely alutaceous and feebly or not shining, prothorax with faint diffuse rufous clouds; ocular lines distinct, finely impressed; front claws of male obviously enlarged. Ave. length 3.4 mm. Kansas and Texas to California.

Head moderately thickly punctate, except within the ocular emarginations, with the usual rufous or brownish markings. Eyes scarcely prominent, separated by the length of the basal two joints of the antennae or slightly more in the male, and by about two and one-half times the length of the basal joint in the female. Antennae very slender, attaining the posterior third of the elytra in the male and the hind coxae in the female, pale yellow, dusky at tip.

Prothorax moderately transverse, rather small in the female, sides arcuately subparallel basally and narrowed in front in the male, slightly convergent

from the base in the female, and either nearly straight or with a slight post-median angulation; punctuation moderately close, not coarse, side margins smooth.

Elytra with the striae broadly discally more or less irregular or confused, more distinct on the declivity, the seventh and eighth fairly regular as a rule in the male (the seventh less so in the female), a little impressed and with close set round punctures; marginal interspace with numerous punctures in basal half or two-thirds; shield small or nearly wanting; marginal punctures of the humeral lobe wanting or nearly so.

Pygidium, under surface and legs entirely pale.

Length 2.8 to 4 mm.; width 1.4 to 2.1 mm.

Distribution.—*Arizona*: Prescott (type); Grand Cañon, July 4; "Ari." (Am. Ent. Soc. Coll.). *New Mexico*: Jemez Springs (Casey). *California*: Bishop, June (Fenyès); "Cal." (Horn Coll.). *Utah*: Utah Lake, June 20 (Hubbard & Schwarz). *Colorado*: (Beyer Coll.). *Kansas*: Douglas Co. (Snow); Salina (Knaus). *Texas*: Davis Mts., July 11 (Wenzel).

The Kansas specimens are all females. There seem to be no differences of any moment between them and the typical Arizona form, but in the absence of males the reference here is tentative.

26. *Pachybrachys iodingi* Bowditch

Robust, convex, suboval, dull pale yellow with blackish brown punctures, elytra with subregular impressed striae; prothoracic M much broken and usually feebly marked, elytra without spots, rarely with the standard spots faintly indicated; front without ocular lines, these being strictly contiguous to the eyes; front claws of male not enlarged. Ave. length 2.7 mm. North Carolina to Florida.

Head rather sparsely punctate, frontal marks small, eyes distant in both sexes, separated in the male by nearly three times the length of the basal antennal joint or by nearly or quite the vertical length of the eye; usually a little more distant in the female. Antennae rather short, scarcely more than half the length of the body in the male, still shorter in the female.

Prothorax rather long, arcuately narrowed in front, punctuation rather coarse, not dense, somewhat irregular, lateral margin smooth.

Elytra usually distinctly less than twice as long as the prothorax, widest at base, punctures mostly in fairly regular series, somewhat confused in a small scutellar area, also with striae four to six more or less confused at middle; marginal interspace with a row of coarse punctures, rather remote basally, but as a rule more numerous toward the apex; point of humeral umbo, and suture very narrowly blackish; shield fairly distinct.

Pygidium and legs almost entirely pale; body beneath in great part blackish.

Length 2.3 to 3 mm.; width 1.35 to 1.65 mm.

Distribution.—*Alabama*: Mobile and vicinity, May and June (Loding); Oak Grove, June 17 (Soltan). *Florida*: Crescent City (Hubbard & Schwarz, Van Duzee); Enterprise, May, and Key West (Leng Coll.); Hillsboro, Tampa and Crescent City (Nat. Mus. Coll.); Jacksonville (Ashmead Coll.); Kissimmee (Van Dyke Coll.). *Georgia*: without definite locality, various collections. *North Carolina*: Southern Pines, June (Manec). *Ohio*: A single specimen sent by Dury bears label Cincinnati.

This species is quite easily recognized by its stout suboval form, pale color and subregular striae. There is considerable variation in several respects; the ocular lines are usually apparently absent, but occasionally are detectable a little removed from the eyes. The sexes differ less than usual in cephalic characters, the eyes in some males being fully as distant as in some females, and the terminal joint of the maxillary palpi is usually—or at least often—nearly as pointed as in the female.

27. ***Pachybrachys placidus*** new species

Dull yellow, prothorax reddish yellow, head reddish brown, lustre dull, upper surface without spots, venter dusky except the margins; ocular lines wanting. Ave. length 3 mm. Arizona.

Head thickly punctate, uniformly dark reddish brown. Eyes large but scarcely prominent, separated in the female by a distance equal to the length of the first two antennal joints, and much less than the vertical width of their upper lobes. Antennae short, not quite half as long as the body (♀), joints nine and ten twice as long as wide, outer joints dusky.

Prothorax moderately transverse, widest at about basal fourth, sides a little retracted and slightly sinuate before the basal angles, moderately convergent and broadly arcuate toward the front, closely punctate almost to side margins, the latter very narrowly smooth.

Elytra parallel, about twice as long as the prothorax, quite regularly striate in posterior half, the punctures more or less confused anteriorly, more especially in a narrow baso-sutural triangle; striae everywhere finely impressed, a little more noticeably at sides, the punctures fine and scarcely at all brownish; submarginal stria nearly regular, the marginal interspace punctured subserially in basal half; shield small but distinct.

Legs pale throughout; front claws (♀) barely appreciably larger than the others.

Length 2.75 to 3.15 mm.; width 1.4 to 1.7 mm.

Distribution.—*Arizona*: Huachuca Mts., July 14–20 (Wenzel).

Only two examples of this species—both females—have been submitted to me. It is easily recognizable among the yellow species by the narrowly separated eyes and absence of ocular

lines. Judging from analogy the eyes must be quite closely approximate in the male. As frequently occurs, two or three of the discal elytral intervals are more regular and entire, and these attract the eye; this may not be true in the male, it being especially characteristic of the females in numerous species.

28. **Pachybrachys livens** LeConte

Pale yellow, finely alutaceous, scarcely or feebly shining, punctures not or but little darker, prothorax with a median, rufo-testaceous or pale brownish stripe; ocular lines distinct and distant from the eyes; front claws of male not appreciably enlarged. Ave. length 2.7 mm. California.

Head rather sparsely punctate, spots small and pale except that on the vertex, which is usually well developed and pale brown, the others often nearly or quite obsolete. Eyes separated by twice (σ^7) or about three (σ^8) times the length of the basal antennal joint. Antennae long in the male, attaining the middle of the abdomen, in the female reaching about to the hind coxae, almost entirely pale, the apices of the outer joints dusky.

Prothorax moderately transverse, sides moderately convergent from the hind angles, feebly very obtusely subangulate at about the basal third, punctation not very close, side margins smooth, a rufo-testaceous or pale brown entire nearly parallel sided median stripe occupying a little less than the middle third; lateral spots wanting.

Elytra entirely yellow, punctures rather dense and confused in a moderate-sized baso-sutural triangle, the striae elsewhere fairly regular, lightly impressed laterally and posteriorly; submarginal stria nearly straight; marginal interspace with one or two punctures near the base; shield small and inconspicuous.

Pygidium entirely yellow; body beneath more or less reddish brown with the usual pale margins; legs entirely pale.

Length 2.3 to 3 mm.; width 1.25 to 1.65 mm.

Distribution.—*California*: Colorado River on *Salix* (type); Yuma, July 3; Pomona, June 11; Los Angeles, Aug. 16 (Wickham); Tulare Co. (Leng Coll.); Kaweah (Hopping); Los Angeles Co. (Coquillett in Nat. Mus. Coll.); Bishop, June (Wickham).

Jacoby records this species from Mexico, but some of the specimens which he so identifies recently sent me, prove to be *jacobyi* Bowd.

29. **Pachybrachys mercurialis** new species

Light yellow, pale brown punctate, integuments polished, elytra immaculate, prothorax with small diffuse pale brownish clouds, the three representing the basal extremities of the M most evident; front claws of male not enlarged. Ave. length 2.75 mm. California and Utah.

Head sparsely finely punctate, front broadly feebly convex, spots small or nearly wanting; ocular lines wanting or feebly indicated and close to the eyes; eyes separated by from rather more than twice to nearly three times the length of the basal antennal joint in the male, and by from three to three and one-half times the length of the basal joint in the female; antennae slender, blackish in outer half, fully two-thirds the length of the body in the male, the tenth joint more than twice as long as wide.

Prothorax moderately transverse, sides nearly straight and moderately convergent from the base, feebly roundly dilated at about the basal third, especially in the male, punctuation rather fine and not very close, side margins smooth.

Elytra twice as long as the prothorax, striae lightly impressed and for the most part distinct, the intermediate ones (3 to 6) often sinuous or somewhat confused, seventh and eighth regular, marginal interspace rarely completely impunctate, typically with a few punctures at and behind the subbasal dislocation of the eighth stria; baso-sutural triangle of confused punctures rather small; shield large, elongate, occupying about two-thirds the post-median part of the interval.

Pygidium black at base, a median spur and two small subdetached spots of same color. Legs pale, median femoral clouds barely visible.

Length 2.5 to 3.2 mm.; width 1.2 to 1.7 mm.

Distribution.—*California*: Isabella, Kern Co., June 1 (Pilate), type ♂; Olancha, Kern Co., June 4 (Fenyès); Siskiyou Co., July (Nat. Mus. Coll.); "Cal" (Am. Ent. Soc. Coll.). *Utah*: Salt Lake, June 13 (Hubbard & Schwarz).

In the type series there is more or less evidence of faint ocular lines very near the eyes. These are not noticeable in the Siskiyou specimens nor in the series from "Cal" (Am. Ent. Soc. Coll.). These last—all females—differ further in having the front more coarsely and closely punctate. These differences do not seem of much moment, more especially since there is a tendency toward a somewhat coarser punctuation of the front in the females of the typical form, and moreover in this sex the faint ocular lines are least discernable. A small male from Monterey, California (collected by Fenyès), is placed here provisionally. It has the elytral punctures darker and seemingly coarser, and the point of the shoulder knob dark; it may possibly be a variety of *laevis*.

30. *Pachybrachys parvinotatus* new species

Yellow, lustre dull, head and prothorax finely alutaceous, the former with the standard marks dark brown or blackish, the latter usually with three small basal fuscous spots, the middle one usually darkest, the lateral ones often faint; elytra with the point of the shoulder knob, and the sutural edge blackish; front

without ocular lines; front claws of male not enlarged. Ave. length 2.9 mm. Colorado and Kansas.

Head finely and rather closely punctate; eyes separated in the male by a distance subequal to the length of the basal two joints of the antennae or to the vertical width of the upper lobe of the eye; in the female by fully twice the length of the basal joint. Antennae moderate, half as long as the body in the female, basal two joints with more or less distinct black spots above, outer joints blackish.

Prothorax densely punctate, the side margins smooth as a rule, though usually very narrowly so; the M represented by the three basal spots.

Elytra excessively minutely wrinkled, lustre dull, punctures more or less completely confused in a rather large baso-sutural triangle, the striae fairly distinct and moderately impressed posteriorly and at sides.

Pygidium narrowly blackish at base, the median spur of the blackish border small, the lateral spots faint or obsolete; body beneath blackish, the abdomen more or less yellow; legs yellow with faint pale brown femoral clouds.

Length 2.7 to 3.1. mm.; width 1.4 to 1.65 mm.

Distribution.—*Colorado*: (type ♀) without definite locality. (Horn and Nat. Mus. Colls.). *Kansas*: Hamilton Co. (Snow); Meade, June 12 (Knaus).

One specimen (Horn Coll.) is labeled "Cal." possibly in error for Col.

31. *Pachybrachys mitis* new species

Dull yellow, minutely alutaceous, not shining, brown punctate, cephalic spots well developed, darker brown; prothoracic spots rather small but diffuse, paler brown; ocular lines wanting; front claws of male not enlarged. Ave. length 2.6 mm. Texas.

Head moderately punctate, closer as usual in the darker areas. Eyes separated in the male by slightly less than twice the length of the basal antennal joint, or by a distance slightly greater than the vertical width of the upper lobe of the eye; in the female by a little more than twice the length of the basal joint of the antennae. Antennae three-fourths as long as the body in the male, tenth joint more than twice as long as wide, basal joints pale, the first two with dark spots on the upper side, outer joints blackish.

Prothorax moderately large in the male, almost as wide as the elytra, widest at basal fourth or fifth, distinctly and somewhat arcuately narrowed anteriorly; smaller in the female with the sides less rounded behind; punctuation close and fairly even, side margins more or less narrowly smooth.

Elytra cylindrical, sides parallel, scarcely sinuate behind the humeri, without spots, sutural edge darker, and sometimes also the humeral umbro; punctures arranged in lines throughout except in a small scutellar area, the striae obviously impressed, brown from the color of the close set punctures, the middle ones—especially five and six—more or less broken and irregular at and in front of the middle; submarginal stria with a strong sigmoid dislocation at base; marginal interspace impunctate; shield distinct.

Pygidium black and yellow; body beneath blackish, apical ventral margin pale. Legs pale with median blackish or brown shades on the femora, and traces of such on the tibiae.

Length 2.4 to 2.75 mm.; width 1.3 to 1.45 mm.

Distribution.—*Texas*: Flatonia, July 30 (H. A. Wenzel), ♂ type; Seabrook, Aug. 6 (Wenzel); San Diego, May 3 (Schwarz); Lavaca Co. (Hubbard & Schwarz); "Tex." (Nat. Mus. Coll.). Several females from Columbus (Hubbard & Schwarz) have the marginal interspace of the elytra punctate; they are placed here provisionally.

In a general way this species is rather close to the preceding, but is smaller, the thoracic M more completely represented, the elytral punctures coarser, less numerous and less confused. The frontal spots are unusually heavy for a yellow species. In two examples small faint standard spots are evident on the elytra.

32. *Pachybrachys coioradensis* Bowditch

Small, pale whitish or grayish yellow, brown punctate, elytra fairly regularly punctate striate, head and prothorax polished, elytra a little less shining but not visibly alutaceous; eyes widely distant; ocular lines distinct but fine; front claws of male not enlarged. Ave. length 2.3 mm. Rocky Mountains, Montana to Arizona.

Head rather large, front feebly convex, the standard markings nearly obsolete, or at most represented by a narrow median line and an ill-defined spot on the vertex; punctuation not close; ocular lines fine, not or scarcely impressed inferiorly. Eyes small, distant by more than their own length in both sexes, a little more widely in the female as usual. Antennae moderate, blackish in outer half, attaining the hind coxae in the male.

Prothorax with moderately close nearly evenly diffused rather coarse punctures, side margins narrowly smoother, spots entirely wanting or small and faint.

Elytra with finely impressed striae, which are fairly distinct throughout except in a moderate sized baso-sutural triangle, where they are confused; shield wanting; marginal interspace with a few punctures at base.

Pygidium entirely yellow or with the base very narrowly black, body beneath blackish with the usual pale margins. Legs pale, with small brownish spots on the thighs.

Length 2 to 2.65 mm.; width 1 to 1.35.

Distribution.—*Colorado*: Colorado Springs, June 15 to 30, type (Coll. by Wickham). *New Mexico*: Coolidge (Wickham). *Arizona*: Winslow, July 31 (Barber & Schwarz). *Utah*: Salt Lake, July 1 (Hubbard & Schwarz); Clear Lake (Wickham); Sevier Lake (type *sevier* Bowd. —Bowditch Coll.). *Montana*: Without definite locality (Leng Coll.). *Wyoming*: Green River (Bowditch Coll. as *sevier*).

This species is easily recognized by the small size, pale color, subequal elytral striae, very distant eyes, fine ocular lines and small front claws in the male. It is quite widely dispersed in the Rocky Mountain region. After a careful examination of the type of *serier* Bowl, I am unable to separate it from *coloradensis*. It differs from a cotype of the latter, kindly given me by Mr. Bowditch, only in being a grain stouter, and more yellow; the marginal interval of the elytra is a bit more numerous punctate basally and there are three punctures behind the middle; this, however, is everywhere a somewhat variable character.

33. *Pachybrachys minor* Bowditch

Very similar to *coloradensis*, and distinguishable as follows: The size is slightly larger, color more distinctly yellow, surface less shining, minutely alutaceous, prothoracic markings more evident though small, and diffuse as a rule, and occasionally entirely wanting; side margins of prothorax more widely smooth. Eyes less distant, separated in both sexes by less than their own length, though but slightly so in the female; in the male by about two and one-half times the length of the basal antennal joint. Ocular lines very conspicuous and widely distant from the eyes, about two-fifths the distance to the median line in the male. Elytral striae nearly as in *coloradensis*, the fifth and sixth more commonly confused at the middle; marginal interspace without punctures; shield fairly distinct; abdomen often entirely yellow.

Length 2.3 to 2.9 mm.

Distribution.—*Arizona*: Walnut—type (coll. by Wickham); Riverside (Wickham). *New Mexico*: (Leng Coll.). *California*: Pomona; Pasadena; Azusa, June and July; Los Angeles Co. (Coquillett in Nat. Mus. Coll.); Independence, July 7. (Wickham) not quite typical. *Texas*: a single specimen without specific locality seems to be identical.

Var. **a**

Two examples from San Felipe, Lower California, sent me by Mr. Beyer, are of a more grayish yellow and show a line of punctures on the marginal interspace extending behind the middle; the form also seems a trifle stouter.

Although comparison is here made with *coloradensis* to which it is closely allied and near which it stands in the table, the resemblance of *minor* to some specimens of *mercurialis* is even more striking, but the latter is at once separable by the absence of ocular lines.

34. **Fachybrachys nero** Bowditch

Dull pale yellow, finely alutaceous, brown punctate, elytral striae nearly regular, very lightly impressed; prothoracic M usually pale and poorly defined, more rarely darker and quite distinct; front with ocular lines; front claws of male not distinctly enlarged. Ave. length 3 mm. Arizona to western Texas.

Head moderately punctate, spots small or moderate, that on the vertex best developed; ocular lines distinct, rather near the eyes as a rule but sometimes a little more distant, notably in the type. Eyes separated by one and three-fifths to one and four-fifths (σ^7) or by about two and three-fourths (φ) times the length of the basal antennal joint. Antennae long and thin, attaining the middle of the abdomen in the male, and the hind coxae in the female.

Prothorax short, strongly transverse, sides nearly straight and moderately convergent from base to apex; punctuation a little uneven, rather sparse except in the darker areas, these varying from quite distinct to almost entirely wanting; side margins rather broadly smooth.

Elytra more than twice as long as the prothorax, sides parallel; punctures confused in a small scutellar area, elsewhere forming nearly regular brown lines, submarginal stria nearly straight at base, marginal interspace without punctures or with but one or two in the position of the subhumeral dislocation of the eighth stria; discal intervals—more especially the second and third—wide posteriorly, the second dilated in the usual position to form the moderate shield, which is not at all more convex.

Pygidium yellow, with sometimes a narrow basal blackish margin. Body beneath brownish or fuscous with the usual paler margins. Legs pale.

Length 2.6 to 3.4 mm.; width 1.3 to 1.8 mm.

Distribution.—*Arizona*: Type from Prescott. Several examples from this locality are before me; also a number of specimens labeled simply "Ari." *New Mexico*: Albuquerque (Wickham). *Texas*: Davis Mountains and Macedonia, July (Wenzel).

All the Texas examples are females; they have a slightly different appearance, due perhaps more than anything else to a little brighter color; I have little doubt, however, that they belong here.

35. **Pachybrachys petronius** new species

Rather close to *nero*, the color a brighter yellow, surface finely alutaceous but somewhat shining, prothoracic markings rather broad and clearly defined, reddish brown, the median stripe narrowly divided anteriorly by a pale line; elytral striae less regular than in *nero*; often more or less suffused with brown along the suture. Ave. length 3.1 mm. New Mexico and Arizona.

Head moderately punctate, vertex spot conspicuous, others small; ocular lines distinct, moderately distant from the eyes. Eyes separated by about

one and three-fifths (σ) or three (φ) times the length of the basal antennal joint.

Prothorax strongly transverse, in the female almost twice as wide as long, not much narrowed in front in the male, the sides very broadly subangulate behind the middle; in the female straighter and a little more convergent; surface unevenly punctured, the paler areas smooth or much more sparsely punctured, side margins rather broadly smooth.

Elytra fully two and one-half times as long as the prothorax, striae lightly impressed, four to six more or less contorted or broken at middle, the others fairly regular; punctures confused in a narrow baso-sutural region; submarginal stria with sigmoid dislocation near base, marginal interspace without punctures; shield distinct.

Body beneath brown with usual pale margins; legs pale, thighs sometimes with faint median clouds. Front claws of male not appreciably enlarged.

Length 2.75 to 3.5 mm.; width 1.5 to 1.85 mm.

Distribution.—*New Mexico*: Jemez Springs (type σ); Las Vegas Hot Springs, Aug. 2 to 10 (Barber & Schwarz); near Las Vegas Hot Springs, 7000 ft., July (Snow). *Arizona*: (Morrison—in Nat. Mus. Coll.); "Ari" (Liebeck Coll).

36. *Pachybrachys tacitus* new species

Very closely related to *petronius*, the description of which applies except as follows. The prothorax is a little less transverse, the sides a trifle more rounded, the markings less complete and less sharply defined, the elytral striae a little coarser and more impressed, the sutural region not darker, but with a tendency in some specimens toward the development of lateral spots.

Distribution.—*Arizona*: Miller Cañon, Huachuca Mts., (Wenzel) type σ , also taken in these mountains by Beyer and Schaeffer; Santa Rita Mts., 5,000 to 8,000 ft. (Snow); Chiricahua Mts., June 1. (Hubbard & Schwarz); Nogales, Sept. 6. (Nunemacher); "Ari" (Am. Ent. Soc. Coll.).

37. *Pachybrachys abdominalis* Say

Cylindrical, convex, pale yellow, minutely alutaceous, not or feebly shining, punctures pale brown to blackish, arranged in fairly regular feebly or scarcely impressed striae on the elytra except in the scutellar region; cephalic and prothoracic spots small or subobsolete; ocular lines distinct, well removed from the eye on the front; front claws of male distinctly larger than the others. Ave. length 3.5 mm. Manitoba to Texas.

Head unevenly, sparsely to moderately closely punctate; frontal spots small, vertex spot small, faint, often nearly or quite wanting. Eyes separated by slightly less than twice the length of the basal antennal joint in the male, and by about two and three-fourths times the length of this joint in the female.

Antennae long, attaining the middle of the abdomen in the male, yellow, outer joints blackish.

Prothorax rather large, distinctly narrowed in front, sides rather strongly arcuate posteriorly, rounded in somewhat at base, more noticeably so in the male, punctuation moderately coarse, not dense, side margins smooth.

Elytra twice as long as the prothorax and slightly wider, punctures confused in the scutellar region, striae two to eight more or less regular, the eighth with or without a subhumeral dislocation; marginal interspace with very few punctures, usually near the base, but occasionally one or two may be at or behind the middle; shield usually ill-defined but occasionally quite distinct.

Pygidium yellow with small black spots, which are occasionally wanting. Body beneath black with the usual pale abdominal margins more or less developed. Legs pale, femora with median brownish spots.

Length 3.25 to 3.75 mm.; width 1.8 to 2 mm.

Distribution.—The locality given by Say is Missouri, which as is well known means the Plains of Western Kansas or Nebraska or possibly Eastern Colorado. The specimens before me bear the following locality labels:

Manitoba: Winnipeg (Wickham Coll.). *South Dakota:* Erwin, June (Van Dyke Coll.). *Nebraska:* McCook (Wickham). *Kansas:* Hamilton, Morton and Clark Cos. (Snow); McPherson and Salina, June (Knaus). *Colorado:* "Col" (Van Dyke Coll.); Greeley and La Junta (Bowditch Coll. as *rotundicollis*). *Texas:* Bowditch Coll. as *rotundicollis*.

It cannot be positively asserted that this is the true *abdominalis* of Say but I have little doubt of it. It fits the short description sufficiently well, and rather better than any other; it is from the same region, and is the species so identified by LeConte. Bowditch describes the present species under the name *rotundicollis* and identifies *abdominalis* differently. A specimen in the Snow Coll. of what I consider to be the western form of *peccans*, and one of *diversus* n. sp. in the Blanchard Coll. bear the name *abdominalis* in Bowditch's handwriting. This confusion—if it be such—is not strange, for the species *peccans* is very variable in its wide range, and in some of its western forms approaches both *abdominalis* and *diversus* so closely as to make the placing of some examples purely a matter of individual judgment, and to suggest specific identity of the three. The extremes, however, look very different, and it is probable that there are really three distinct species—perhaps more—although I am not now able to definitely draw the lines of separation.

Abdominalis is as a rule slightly larger and more robust, of a pale grayish yellow color, the head and thorax with at least traces of the standard spots, but the elytra without markings—at least none are mentioned either in the short diagnosis of Say or in the longer description by Suffrian, who had seen an authentic example from Say in the Germar Collection.

Peccans averages a trifle smaller, the yellow color somewhat variable, frequently a little brighter in tint than in *abdominalis* but often not so, the black markings of the head and prothorax distinct, often large, the elytra nearly always with at least traces of spots, and not infrequently more black than yellow.

Diversus is somewhat smaller, typically, and indeed almost always of a brighter yellow than *abdominalis*. Many specimens are as free from markings as *abdominalis*, but in others the upper surface throughout is more or less varied with rust red to fuscous shades, and some of the more distinctly marked forms are so like lightly marked western specimens of *peccans* as to be scarcely distinguishable.

38. **Pachybrachys diversus** new species

Yellow, minutely alutaceous, scarcely or slightly shining, brown punctured, markings usually pale rust colored and feeble or nearly wanting, but sometimes darker and more distinct; ocular lines distinct, moderately distant from the eyes; front claws evidently enlarged in the male. Ave. length 2.9 mm. Illinois to Nebraska and south to Texas.

Head unevenly punctured, spots feeble and due chiefly to the grouping of the brown punctures. Eyes separated in the male by a little more than twice the length of the basal antennal joint, or by a distance subequal to or slightly greater than the vertical width of the upper lobe of the eye; in the female by about three times the length of the basal joint of the antennae. Antennae thin, outer joints more or less dusky, attaining the apical third of the elytra in the male and the hind coxae in the female.

Prothorax moderately transverse, widest and moderately strongly arcuate slightly before the base, the sides a little retracted behind, distinctly convergent and broadly rounded or nearly straight anteriorly; disk rather coarsely, unevenly and not very closely punctate, side margins smooth; standard spots obsolete or represented by feebly developed and diffuse reddish brown shades.

Elytral striae a little impressed, more or less sinuous—the fifth and sixth generally the most irregular—but fairly well defined except in a rather small

baso-sutural triangle; submarginal stria with the usual subhumeral interruption; markings often entirely wanting, and when present usually feeble, consisting of traces of some of the standard spots in pale brown. Rarely the prothoracic markings become heavy and the disk of the elytra is suffused with darker brown along the suture.

Pygidium pale, the darker basal margin and spots usually feebly defined. Body beneath variable in color, the abdomen sometimes nearly uniformly yellow, but more commonly with the median portions darker; sterna usually of some shade of brown. Legs pale with diffuse light brown shades on the tighs.

Length 2.5 to 3.3. mm.; width 1.3 to 1.75 mm.

Distribution.—*Illinois*: Quiney, June 14 (Knaus); "S. Ill." (Nat. Mus. Coll.-Soltau). *Iowa*: Eastport (Wickham Coll.). *Missouri*: St. Louis (Nat. Mus. Coll.-Soltau). *Kansas*: Clark Co., 1962 ft., May, and Douglas Co. (Snow); Salina (Knaus); Rago, August; Medora (Leng Coll.); others from "Ks" without definite locality. *Nebraska*: Nebraska City (Wickham Coll.—Elliott). *Dakota*: (Wenzel Coll.). *Texas*: Dallas (Wickham); Columbus, June 21, July 28 (Hubbard & Schwarz); Austin (Casey); Camp San Saba, May 27 (Knaus); Brownsville, May 1 (H. S. Barber); Galveston, May (Snow); Texas (Leng Coll.); Seabrook, Aug. 5 to 7, identity doubtful (Wenzel). El Paso, var.? (Fenyés).

The type is a male from Douglas Co., Kansas.

In common with Mr. Bowditch, I had supposed this species to be the *xanthias* of Suffrian until a type of the latter sent me by Prof. Taschenberg showed it to be an entirely different species.

In its typical form the present species is readily separated from all others, but in certain of the diverse variations which I have felt compelled to include under the name there is a very definite approach to both *abdominalis* and *peccans*, so that the disposition of sundry individuals is purely a matter of opinion. The tabular characters and remarks under *abdominalis* will generally suffice for the separation of the latter from *diversus*. As *peccans* is tabulated in a different part of the genus, a somewhat detailed comparison may fittingly be given here. *Diversus* is in general a rather smaller species than *peccans*, of a brighter yellow color, the markings typically nearly wanting and rarely having anything more than faint rust colored traces of the standard spots; the pygidium is nearly always in great part yellow; the upper surface is always finely alutaceous and scarcely or but feebly shining; the eyes are less distant, being separated in the male by evidently less than twice the length of the basal antennal joint. In *peccans* the color is typically and generally of

a paler grayish yellow, the markings black or fuscous and more or less conspicuously developed, the pygidium in great part black, rarely as much yellow as black; the upper surface often distinctly shining and sometimes even polished, with faint traces of alutaceous sculpture; eyes more distant, as a rule separated in the male by twice the length of the basal antennal joint. These characters—or in fact almost any one of them—will suffice in the vast majority of cases to distinguish the two species, but it must be said that occasionally one or another fails and in rare instances about all of them do, and then—especially when dealing with single specimens—the experience and judgment of the student can alone decide.

39. **Pachybrachys pusillus** Bowditch

Cylindrical, convex, dull yellow, surface minutely alutaceous and feebly shining, punctures pale brown, spots almost wanting, elytra subregularly striate, ocular lines fine but traceable, front claws of male scarcely perceptibly enlarged. Ave. length 2.6 mm. Texas and Arizona.

Head rather sparsely irregularly punctate; eyes separated in the male by a distance subequal to the length of the first two antennal joints or by distinctly less than the vertical width of the upper lobe of the eye; in the female by nearly twice the length of the basal joint or by a distance equal to or slightly greater than the vertical width of the upper lobe. Antennae short, barely reaching the hind coxae in the male, outer joints dusky at their tips.

Prothorax rather large, moderately transverse, sides arcuate and moderately convergent toward the front; punctuation somewhat uneven, moderately close, side margins smooth, the M faintly or scarcely indicated in slightly darker tint.

Elytra without markings; striae a little impressed, subregular except in the scutellar region, the fifth and sixth often broken at middle, the eighth sometimes interrupted, sometimes merely sinuate behind the humerus; marginal interspace devoid of punctures; shield distinct.

Pygidium pale yellow, the spots small and faint, or subobsolete. Body beneath a little darker in color, the metasternum reddish brown.

Length 2.2 to 3 mm.; width 1.2 to 1.6 mm.

Distribution.—*Texas*: Brownsville (type) and San Antonio (in Bowditch Collection); Brownsville, May 24 (H. S. Barber in Nat. Mus. Coll.), July 23 (Woleott), June (Snow), Aug. (Beyer), Apr. and May (Dury), June and July (Schaeffer); San Antonio (Wickham); Maedona, July 28 (Wenzel); New Braunfels, Aug. 9 (Schwarz); Uvalde, 930 ft., June 18 to 20 (Wickham); S. W. Tex. (Am. Ent. Soc. Coll.); Tex. (Leng Coll.). *Arizona*: San Bernardino Ranch, Cochise Co., 3,750 ft. (Snow).

The species most likely to be confused with the present one are *diversus*, *abdominalis* and *longus*, but all are quite easily separated by the tabular characters. In addition to the more remote eyes, both *diversus* and *abdominalis* have the front claws distinctly enlarged in the male and the ocular lines are more conspicuous.

40. ***Pachybrachys macronychus*** new species

Rather large, yellow, brown punctate, minutely alutaceous, moderately shining; cephalic spots small, pale brown, thoracic M represented by pale diffuse rust colored shades, elytra without spots; ocular lines wanting, front claws of male very large. Ave. length 3.8 mm. Texas.

Head densely punctate in the darker areas, elsewhere sparsely so or nearly smooth. Eyes separated in the male by about one and one-half times the length of the basal antennal joint, the distance nearly the same as the vertical width of the upper lobe of the eye. Antennae (♂) long and thin, not much shorter than the body, tenth joint four times as long as wide.

Prothorax two-fifths wider than long, sides distinctly convergent in front, strongly rounded posteriorly, incurved at base, surface moderately closely punctate, quite thickly so in the shaded areas, median line narrowly and imperfectly or incompletely smooth, side margins smooth.

Elytro less than twice as long as the prothorax, coarsely punctate, the second, third and eighth striae fairly regular in one example, the second and eighth in a second specimen, the other striae much broken or confused; eighth stria moderately impressed and with a subhumeral dislocation, other striae less evidently impressed; shield indicated but not very well defined.

Pygidium blackish in basal half, marked as usual. Body beneath blackish brown, the propleura lighter brown, margin of last ventral segment broadly yellow. Legs rufo-testaceous, ends of middle and hind tibiae pale.

Length 3.7 to 3.85 mm.; width 1.9 mm.

Distribution.—*Texas*: Green Valley, Chisos Mts., Brewster Co., July 15 (type ♂), and Davis Mts., July 8 (H. A. Wenzel).

Three males of this fine species are before me, submitted by Mr. Henry Wenzel.

41. ***Pachybrachys crassus*** Bowditch

Robust, pale yellow, brown punctate, finely alutaceous, not shining, markings small on the head and prothorax, usually wanting on the elytra, the lateral spots sometimes indicated; eyes more narrowly separated than the width of their upper lobes in the female, ocular lines wanting. Ave. length (♀) 4.2 mm. Utah and Arizona.

Head slightly convex, the darker areas, especially the median line, thickly punctate, elsewhere sparsely so. Eyes (♀) separated by a distance equal to the length of the basal two joints of the antennae, or by about three-fourths the vertical width of the upper lobe of the eye. Antennae (♀) about half the length of the body, pale yellow, outer joints dusky, tenth joint three times as long as wide.

Prothorax fully one-half wider than long, moderately narrowed in front, sides arcuate posteriorly, feebly incurved at base; surface thickly punctate in numerous small semi-detached brown spots which combined make up the standard M; elsewhere sparsely punctate, the side margins rather widely smooth.

Elytra coarsely brown punctured, the punctures arranged in moderately impressed more or less regular lines posteriorly, but much broken anteriorly except the eighth and perhaps the second and third striae, which are entire; completely confused in the scutellar region; eighth stria with sigmoid dislocation behind the humerus; marginal interspace without or with a few coarse punctures near the interruption; shield moderate.

Pygidium yellow, basal margin with large median spur and a small spot on each side, fuscous; body beneath more or less brown, the margins paler. Legs yellow, femoral spots small, pale brown; front claws slightly larger than the others in the female and presumably very distinctly so in the male.

Length 4 to 4.3 mm.; width 2.15 to 2.35 mm.

Distribution.—*Utah*: St. George (Wickham), type ♀ in Bowditch Coll. *Arizona*: Bill Williams Fork (Snow); Yuma, Apr. 22 (Fenyés).

Three examples are before me, all females. In the Bill Williams Fork example, there are small but quite distinct lateral elytral spots, the middle spot faintly indicated. The eyes are quite narrowly separated in the female and in the male will without doubt be found still more approximate. There are in the material before me two males, one from Arizona, the other without any locality but unquestionably of the same species, which agree so well in all essentials with the above females that I am provisionally placing them together. At first glance they differ so notably by their more elongate form, that the name *longus* would seem to apply much better than *crassus*; however, sexual differences in the robustness of body are often quite marked and need occasion no surprise. The punctures are a little denser in the dark areas of the pronotum and seem slightly coarser on the elytra and of deeper tint generally—fuscous in one of the two examples. The eyes are separated by about three-fourths the length of the basal antennal joint; the front claws are moderately strongly enlarged; the terminal joint of the maxillary palpus is broadly truncate, in fact not at all narrowed apically.

This is one of our largest species, and in point of size is not closely approached by any other of this group. It most nearly resembles *fortis*, which because of the feeble markings of the elytra has been placed among the mottled species. As stated above, however, one example of *crassus* shows small lateral spots on the elytra, and it is not unlikely that specimens of *fortis* may occur without elytral spots, in which case the two species might easily be confused. The eyes in *fortis* are less approximate than in *crassus*, and in the female are more widely distant than the vertical width of their upper lobes; the marginal interspace of the elytra is also more numerous punctate in *fortis*.

42. **Pachybrachys longus** Bowditch

Pale yellow, scarcely shining, brown punctate, head and prothorax lightly marked with pale brown or rust colored spots or clouds; elytra typically without spots, but occasionally with the spots faintly indicated; eyes narrowly separated, ocular lines fine and near the eyes, elytral striae subregular; front claws of male perceptibly but not conspicuously larger than the others. Ave. length 2.7 mm. Arizona.

Head moderately punctate, more closely on the vertex and in the median impressed line. Eyes separated by rather less than (σ), or by about the length (φ), of the basal antennal joint or a trifle more. Antennae pale, outer joints dusky, in the male about three-fourths and in the female about one-half the length of the body.

Prothorax moderately transverse, sides moderately rounded, incurved a little at base, not greatly narrowed anteriorly, somewhat irregularly punctate, more closely in the dark areas, rather sparsely elsewhere, side margins smooth.

Elytra confusedly punctate in a rather small baso-sutural area, elsewhere with subregular striae, the fifth and sixth, however, often more or less broken or irregular; striae a little impressed, more noticeably so toward the sides; marginal interspace with at most a few punctures near the subbasal interruption or situation of the eighth stria; shield usually well developed.

Pygidium and lower surface brownish or fuscous and yellow, the colors distributed as usual; legs pale yellow with light brownish shades at middle of thighs.

Length 2.4 to 3 mm.; width 1.25 to 1.6 mm.

Distribution.—*Arizona*: Tucson (Wickham), July 21 (Hubbard & Schwarz).

The type in the Bowditch Collection is a female, also from Tucson.

This species is notable in its narrowly separated eyes, which character will distinguish it from others of like appearance.

43. *Pachybrachys bullatus* new species

Form rather narrow, yellow, variegated with pale to dark brown, surface polished, eyes very approximate in the male, no ocular lines, elytra with a transverse row of more or less conspicuous convex pale spots behind the middle; front claws of male not at all larger than the others. Ave. length 2.7 mm. Arizona; Texas.

Head rather closely brown punctate, median line fine, front mostly yellow in the male, more brown than yellow in the female. Eyes separated in the male by front less than one-half to about four-fifths the length of the basal antennal joint, in the female by slightly less than twice the length of the basal joint. Antennae about two-thirds the length of the body in the male, a little shorter in the female, color either entirely pale or with the outer joints dusky, tenth joint less than three times as long as wide.

Prothorax moderately transverse, distinctly narrowed in front, sides strongly rounded behind the middle, incurved and sinuate before the basal angles, nearly straight or sometimes feebly sinuate anteriorly; surface densely, somewhat unevenly, rather coarsely punctate, with small raised impunctate spots; M represented by three basal and two median spots in transverse rows, the spots varying from fairly distinct to quite diffuse and occasionally involving the greater part of the surface.

Elytra one-fifth wider than the prothorax and about twice as long, sides distinctly sinuate behind the humeri; punctation quite dense and usually broadly confused on the disk, the marginal interspace and some portions of the others more or less evident and convex, especially toward the rear; a transverse row of small raised pale yellow spots beginning just behind and outside the shield and extending to the side margin; shield small, sometimes indistinct; marginal stria well impressed, more or less irregular near the base; marginal interspace with coarse punctures in basal half. The color is somewhat variable. In two females and one male the base, apex and transverse row of spots are above yellow, and contrast strongly with the general brown color of the disk; in the remaining specimens—all males—the brown color is less extensive and paler, and though diffuse, roughly indicates the standard spots.

Pupillum yellow, slightly darker basally but without any evident maculation. Body beneath brown, apical margin of last ventral yellow. Legs yellow without spots.

Length 2.4 to 3 mm.; width 1.3 to 1.7 mm.

Distribution.—*Arizona*: male type taken by the writer July 3, 1904, at Williams. Also taken by Barber & Schwarz at the same place during June and July. Nogales, Aug. 26. Nomenclacher; Rincon Mts., 5,000 ft., July. Beyer; Huachuca Mts., July 14. Wenzel; "Ari" Morrison, in Nat'l. Mus. Colln., Texas; Davis Mts., July 8. Wenzel.

This species is one of the most distinct in our fauna. It is notable for the very narrowly separated eyes in the male, their

distance apart, however, showing a rather unusual degree of variation. In the Rincon Mountains specimen they are almost in contact, and in the Nogales one are more approximate than in any of the Williams examples. In these two the thoracic punctuation is also denser than in the others.

44. ***Pachybrachys texanus*** Bowditch

Dull yellow with brown markings which vary much in shade and distinctness; eyes narrowly separated; elytra distinctly striate at sides and rear; front tibiae of the male sinuate on the inner side near the apex, the inner angle produced in a long stout curved spur; front claws of male obviously larger than the others. Ave. length 2.4 mm. Texas.

Head moderately closely punctate, front flat with fine impressed median line, markings varying from distinct to almost wanting, no ocular lines. Eyes separated in the male by about two-thirds the length of the basal antennal joint, in the female by the length of the basal joint or a little less. Antennae pale basally, outer joints dusky, half the length of the body in the female, about two-thirds the length of the body in the male.

Prothorax moderately transverse, sides broadly rounded, widest behind the middle, very slightly convergent behind, more obviously so in front; surface densely but a little unevenly punctate, side margins smooth; markings diffuse, pale rust colored to dark brown.

Elytra closely confusedly punctate in the scutellar region, elsewhere with impressed striae which are more or less irregular or broken at the middle of each elytron; two outer striae regular, the eighth feebly or scarcely interrupted behind the humerus; marginal interspace with a few punctures toward the base; shield distinct; markings variable in distinctness, the standard spots usually indicated, but occasionally wanting.

Pygidium brown and yellow; body beneath brown and yellow, the colors distributed as usual; legs yellow with brown spots on the thighs.

Length 1.9 to 2.8 mm.; width 1 to 1.45 mm.

Distribution.—*Texas*: The type and great majority of specimens seen by me are from Brownsville, taken from April to August by Wickham, Barber, Dury, Wolcott, Schaeffer and others; Arroyo, Dec. 10 (Townsend); Columbus, June (Hubbard & Schwarz); Victoria, Mar. 3 to Apr. 2 (Schwarz).

The narrowly separated eyes combined with the greatly developed terminal spur of the front tibiae distinguish this species from all others known to me except the following, which see for a statement of differences. In *calcaratus* there is a similar development of the tibial spur, but in this species the eyes are much less approximate.

45. **Pachybrachys uncinatus** new species

Very similar in essential characters to *texanus*, from which it differs as follows. The size is distinctly larger, the yellow ground color a little paler, the punctures and markings darker, being uniformly blackish fuscous in all males of the series before me, but somewhat less dark in the single female. Eyes slightly less approximate than in *texanus*, being separated by about three-fourths the length of the basal antennal joint in the male, and by just visibly more than the length of this joint in the female. The male sexual development of the front tibiae is nearly identical with that in *texanus* but the tibiae seem a trifle more widened apically, while the spur at the inner angle is not quite as long. The posthumeral sinuation or interruption of the submarginal elytral stria is here the rule, while in *texanus* it is the exception. The front claws of the male are evidently a little larger than the others but the difference is not quite as marked as in *texanus*. The pronotal standard markings are well developed, but as a rule the elytral spots are small, the posterior ones consisting generally of broader fuscous streaks along the striae. The punctuation of the elytra is rather dense and confused in a broad baso-sutural triangle, the striae defined at sides and rear; shield well developed.

Length 2.9 to 3.5 mm.

Distribution.—*Arizona*: Four males, one female sent by Mr. Schaeffer. The type is a male. A female from Tueson, Apr. 21 (Hubbard & Schwarz), appears to belong here.

46. **Pachybrachys pectoralis** Melsheimer

Form—especially of the male—narrower than usual; dull yellow, maculate with brown or black, not or scarcely shining; eyes narrowly separated, ocular lines present; front tibiae sinuate on the inner margin beyond the middle, front claws of male obviously though not greatly enlarged. Ave. length 2.5 mm. Northeastern States, extending to Georgia and westward to Iowa.

Head small, unevenly punctured, yellow, a brown central line connected with a small vertex spot; ocular lines usually rather fine, but somewhat variable. Eyes separated in the male by about three-fourths the length of the basal antennal joint, and by very little more than the length of this joint in the female. Antennae moderate, about two-thirds (σ) or one-half (φ) the length of the body, outer joints blackish.

Prothorax moderately narrowed in front, widest behind the middle, sides slightly convergent and a little sinuate before the hind angles, surface rather thickly but somewhat unevenly punctate, side margins smooth; standard spots fairly distinct, the general impression given being a transverse basal row of three spots, and anterior to these a spot each side of the middle, often reaching nearly to the apical margin. Elytra rather conspicuously wider than the prothorax, rather deeply striate externally and on the posterior convexity, punctures confused in a scutellar area of variable size, the striae much broken

medially on each elytron; eighth stria more or less interrupted behind the humerus, marginal interspace with a few coarse punctures (rarely lacking) subbasally; shield small, usually indistinct; standard spots not large, usually distinct except the basal one of the inner series which is rarely if ever present.

Pygidium mostly yellow, basal margin brown. Body beneath brown or blackish with dull yellow abdominal margins more or less developed. Legs yellow with small dark femoral spots.

Length 2.25 to 2.7 mm.; width 1.15 to 1.45 mm.

Distribution.—*New Hampshire*: (Blanchard Coll.). *Massachusetts*: Lowell; Tyngsboro; Wakefield; Wellfleet (Colls. Blanchard, Wickham, and my own). *Rhode Island*: Berkeley, Aug. 27. *New York*: Staten Island, July (Leng). *New Jersey*: Anglesea, July 23 (Hubbard & Schwarz); Greenwood Lake (Leng); "N. J." (Liebeck). *Pennsylvania*: (Liebeck). *Maryland*: Plummer's Island, June and July (Schwarz & Barber). *Virginia*: without definite locality. *Georgia*: Clayton (Leng). *Alabama*: Pineapple (Hubbard & Schwarz). *Michigan*: Detroit (Hubbard & Schwarz). *Illinois*: Algonquin (Nason). *Iowa*: Elma, June 30 (Snow Coll.).

This is a well characterized species and not confusable with any other except *sobrinus*, which it greatly resembles. The sinuation of the anterior tibia is unique and apparently independent of sex, and though rather small and shallow is sufficiently obvious when the tibia is in a proper position for observation.

My interpretation of this species is based on undoubtedly authentic specimens in the old Melsheimer and Ziegler Collections.

47. *Pachybrachys sobrinus* Haldeman

Almost precisely like *pectoralis* in general appearance and differing only as follows. Eyes not quite so approximate, distant in the male by the length of the basal antennal joint and in the female by about the length of the first two joints of the antennae; front tibiae not sinuate on the inner margin. Taking the material at hand as a whole, the elytral striae are apt to be less deep in *sobrinus*, the maculation more variable both in extent and depth of color, the two posterior spots more often confluent. The size is also distinctly greater on the average in *sobrinus*.

Length 2.6 to 3.25 mm.; width 1.25 to 1.65 mm.

Distribution.—Equally as widely dispersed as *pectoralis* and over nearly the same area, but *pectoralis* is the more common of the two in the northern or at least in the northeastern part of its range, while *sobrinus* is more abundant toward the south. It was described from the "Southern States."

I have seen specimens from the following localities:

Vermont: Bennington (Leng Coll.). *New York*: Staten Island (Leng); "N. Y." (Van Dyke Coll.). *Pennsylvania*: Ebola, June 26; Allegheny (Snow & Leng Coll's.). *Maryland*: Plummer's Island, May and June (H. S. Barber; W. V. Warner); Baltimore, June 26 (Blaisdell). *Virginia*: Newport News (Horn Coll.); Va. (Leng Coll.). *West Virginia*: White Sulphur Springs (Fenyès). *North Carolina*: Black Mts., June (Van Dyke). *Ohio*: Cincinnati (Dury). *Indiana*: Floyd Co., June 28 (Type of *sticticus*—Blatchley Coll.). *Illinois*: Algonquin, Aug. 28 (Nason); Quincy, June 14; "Ill.?" (Horn Coll.). *Iowa*: Eastport (Wickham Coll.). *Missouri*: "C. Mo.," June, on locust (Riley—in Nat. Mus. Coll.). *Nebraska*: Crete (Schaeffer Coll.). *Kansas*: Wallace Co. (Snow); Medora (Leng Coll.); Salina (Knaus); Ks. (Horn and Liebeck Colls.). *Arkansas*: Fayette, Aug. 5 (Knaus Coll.). *Texas*: Fort Worth, May 25; Tex. (Horn Coll.).

I have followed LeConte in his interpretation of *sobrinus*. Suffrian makes this name a synonym of *pectoralis* Melsh.; a very natural error, and one almost sure to be made by anyone overlooking the ocular and tibial characters.

I have seen the specimen which Bowditch mentions as purporting to be the type of *oculatus* Suffr. and which he referred to *pectoralis*. My own observation satisfied me that the specimen in question was identical with *sobrinus* rather than *pectoralis*, and if the specimen sent to Bowditch by Prof. Tashenberg was the true *oculatus*, the name must fall into synonymy.

Mr. Blatchley has very kindly sent me his type of *sticticus* for examination, and there can be no question of its identity with *sobrinus*.

48. ***Pachybrachys contractifrons*** new species

Small, pale whitish yellow, not shining, pale brown punctate with brown markings, distinct on the prothorax, faint on the elytra. Eyes narrowly separated, no ocular lines. Front claws of male distinctly enlarged. Length 2.25 mm. Arizona.

Head flat, unevenly punctate, a dark central line, wider below, and connected above with a small vertex spot. Eyes (♂) separated by three-fourths the length of the basal antennal joint. Antennae (♂) two-thirds as long as the body, outer joints dusky.

Prothorax moderately transverse, widest at basal fourth, gradually feebly arcuately narrowed in front, a little retracted behind but without distinct sinuation before the hind angles; surface unevenly punctate, densely so in the dark areas, sparsely elsewhere, the basal portions of the M well defined, the apical parts disintegrated; side margins smoother.

Elytra short, distinctly less than twice as long as the prothorax, striae in great part sinuous or broken, intervals moderately convex at the sides and rear;

shield distinct; eighth stria sinuous, dislocated behind the humerus, marginal interspace impunctate; standard spots incompletely and vaguely indicated, the median lateral spots wanting, the posterior spots coalescent.

Pygidium brown and whitish yellow. Body beneath brown, abdominal apex pale. Legs pale with light brown femoral spots or shades.

Length 2.25 mm.; width 1.2 mm.

Distribution.—*Arizona*: Hot Springs, June 27 (Barber & Schwarz). The unique male type is in the National Museum Collection. A female from Tucson, Ariz., April 21 (Hubbard & Schwarz Coll.), is doubtfully associated. In it the eyes are separated by the length of the basal antennal joint; the lateral interspace of the elytra is sparsely punctate, the yellow color is brighter and the form seems a bit more elongate; length 3 mm.

49. ***Pachybrachys alacris*** new species

Rufo- to flavo-testaceous, finely alutaceous, the thorax scarcely, the elytra feebly shining; standard spots brown, small and feebly indicated; elytra distinctly striate; eyes (♀) separated by not more than three-fourths the vertical width of their upper lobes; front claws of male probably not appreciably larger. Ave. length 3.15 mm. *Arizona*.

Head evenly not very densely punctate, markings obsolete; ocular lines feebly indicated, very fine and close to the eyes. Eyes (♀) separated by a little more than the length of the rather small basal antennal joint. Antennae (♂) scarcely passing the humeral umbo, the tenth joint twice as long as wide, outer joints dusky.

Prothorax moderately transverse, widest at basal fourth or third, sides broadly arcuate, moderately convergent in front; punctures not dense, uneven, rather sparse except in the small and rather indistinct darker markings; smoother along the side margins.

Elytra confusedly punctate in the baso-sutural triangle, elsewhere with fairly regular impressed striae, the fifth and sixth broken or confused at middle; eighth stria dislocated near the base; marginal interspace impunctate; shield elongate, distinct; standard spots feebly indicated.

Pygidium predominantly pale. Body beneath blackish brown, the sides of the abdomen and the last ventral segment in great part pale. Legs rufo-testaceous, with feeble or obsolete femoral clouds.

Length (♀) 3 to 3.25 mm.; width 1.5 to 1.6 mm.

Distribution.—*Arizona*: type (♀) without definite locality; a second female from San Bernardino Ranch, Cochise Co., 3,750 ft. (E. G. Smyth in Knaus Coll.).

This species bears a general resemblance to *calidus*, but is more obscurely marked and with more approximate eyes, the latter being as close in the female of *alacris* as in the male of *calidus*. The ocular lines are more distinct in *calidus*, barely detectable in *alacris*.

50. **Pachybrachys chaoticus** new species

Robust, yellow, brown punctate and with rather sharply defined brown markings; eyes narrowly separated, front without ocular lines; punctuation throughout sparse and irregular; front claws of male strongly enlarged. Ave. length 3.8 mm. Arizona.

Head with few punctures except in the dark median line and vertex spot. Eyes separated in the male by barely the length of the basal antennal joint, and by about one and one-half times the length of the basal joint in the female. Antennae very slender, nearly the length of the body in the male, the tenth joint four times as long as wide.

Prothorax rather large, sides arcuately convergent from near the base to the front angles, rounded in a little at base, without evident sinuation before the angles; markings sharply defined and consisting entirely (in the type) of aggregations of brown punctures roughly forming the thoracic M, the remaining portions of the disk with sparse scattered punctures, the side margins broadly subimpunctate.

Elytra very irregularly and sparsely punctate, with broad impunctate spaces, the eighth stria entire but strongly sinuate, the others scarcely evident except for their short apical portions on the posterior convexity; shield large, rounded; marginal interspace impunctate; standard spots distinct, rather small, the two posterior ones of the inner series confluent.

Pygidium brown and yellow, body beneath brown, abdominal apex pale. Legs yellow, with median brown shades on the femora and tibiae.

Length 3.4 to 4.2 mm.; width 2.1 to 2.35 mm.

Distribution.—*Arizona*: The male type was given me years ago by a non-entomological friend who took it if I am not mistaken near the Colorado River. The above description is drawn from the type, but I have since seen a female from the Rincon Mts. (5,000 ft., July) in Mr. Beyer's Collection and a pair from Oracle (July 6 to 15) in the Hubbard & Schwarz Collection. These do not necessitate any change in the original description except as to measurements of length and width, the original male being smaller than any of the specimens subsequently seen.

51. **Pachybrachys peltatus** new species

Yellow, with sharply defined but not very heavy black markings, surface minutely alutaceous but somewhat shining. Prothoracic M entire; elytra with the inner row of standard spots irregularly confluent and surrounding the large orbicular yellow shield, which is very conspicuous. Front without ocular lines; claws of front tarsi obviously though not strongly enlarged. Ave. length 3.25 mm. Lower California; Mexico.

Head not wider than the thoracic apex, front feebly convex, rather sparsely and finely subevenly punctate; color largely yellow, a short median line and small vertex spot fuscous. Eyes separated in the male by a distance subequal to the length of the first two antennal joints, or by a little less than the

vertical width of their upper lobes; in the female by slightly more than the width of their upper lobes. Antennae thin, nearly as long as the entire body in the male, but little longer than half the body in the female, the tenth joint (σ) fully four times as long as wide, color yellow, the outer joints dusky.

Prothorax widest slightly in front of the base, sides distinctly convergent from this point to the apex, surface sparsely irregularly punctured, the pale areas with very few punctures, the M rather narrow, a little irregular, but sharply defined and nearly attaining the front margin; side margins broadly smooth.

Elytra twice as long as the prothorax, striae irregular, first strongly deflected about the shield, and in front of the latter geminate with a short scutellar stria; second and third geminate and entire, fourth irregular but entire, fifth and sixth represented by a few confused basal punctures, three or four others at the middle and a short impressed fragment at the declivity; seventh and eighth entire, the latter with a pronounced subhumeral dislocation; marginal interspace impunctate. The black markings represent the standard spots, of which the humeral spot is isolated, the middle and posterior ones of the outer series are connected along the margin, and each is connected to the corresponding one of the inner series; the spots of the inner series are longitudinally confluent so as to leave an impunctate juxta-scutellar spot, the large shield and the apex yellow.

Pygidium almost entirely yellow; body beneath blackish, sides and tip of abdomen pale.

Legs yellow, the middle and posterior femora and tibiae with faint median fuscous spots or shades, the tips of the thighs whitish yellow.

Length 3.2 to 3.5 mm.; width 1.6 to 1.95 mm.

Distribution.—The type is a female from "Lower California," sent by Mr. Liebeck. There is a single male from Tepic, Mexico, in the National Mus. Coll. This latter bears the name *P. inclusus* Jac., but is quite distinct from a specimen of the latter sent me from the British Museum Collection, and bearing the name *inclusus* in Jacoby's handwriting. This species, by the peculiar elytral striae and large shield, looks quite unlike anything else in our fauna, and though it is not impossible that it has been described from Mexico, I am unable to locate it and venture to give it a name.

52. ***Pachybrachys peninsularis*** new species

Rather large, dark brown and yellow mottled, the darker color predominant on the thorax, the elytra either with the brown predominating or with the colors about equal in extent. Eyes separated by a distance less than the length of the basal antennal joint. Antennae very slender, the terminal joint in the male

slightly inflated at apical third. Front claws of male much enlarged. Ave. length 3.4 mm. Lower California.

Head rather small, eyes not at all prominent, punctures sparse except in the dark median line; eyes separated in the male by scarcely half the vertical width of their upper lobes or by a little less than the length of the basal antennal joint. Antennae slender, fully four-fifths as long as the body in the male, tenth joint four times as long as wide.

Prothorax large, strongly narrowed in front, scarcely narrower than the elytra, sides subparallel or at least not distinctly incurved in basal third, the lateral edge slightly wider and narrowly sub-explanate toward the hind angles, distinctly visible from a vertical view point; basal lobe narrower and more prominent than usual; surface dull and densely punctate, sparser in two disintegrated yellow basal spots and along the yellow median anterior line; side margins smooth, yellow.

Elytra minutely alutaceous but distinctly shining, punctuation confused baso-suturally, striae impressed, the two lateral ones continuous, the others for the most part broken or irregular except on the rear convexity; shield irregularly rounded, convex, yellow; marginal interspace without punctures, the eighth stria with subbasal interruption; standard spots indefinite, the surface more or less predominantly brown, with numerous small raised yellow spots, either isolated, or forming parts of the convex interspaces.

Pygidium brown with two large confluent apical yellow spots. Body beneath brown, last ventral largely yellow. Legs yellow with brown or fuscous femoral and tibial rings or shades.

Length 3 to 3.75 mm.; width 1.65 to 2.1 mm.

Distribution.—*Lower California*: San Felipe (type ♂), and El Taste (Beyer).

In size, color and sculpture, this species is nearly identical with *turgidicollis*, but the latter may be distinguished by the less approximate eyes and posteriorly inflated prothorax with sides strongly incurved basally, the reflexed side margin normally narrow.

53. ***Pachybrachys turgidicollis*** new species

Black or fuscous and yellow maculate, the darker color predominating. Eyes separated by a distance distinctly less than, in the male, or, in the female, subequal to the vertical width of their upper lobes; front without ocular lines. Prothorax strongly inflated behind the middle especially in the male; elytral shield large and conspicuous; front claws of male much enlarged. Ave. length 3.75 mm. Western Texas.

Head barely as wide as the thoracic apex, darker areas closely punctate, yellow areas sparsely punctate or impunctate; eyes separated by only slightly more than the length of the basal antennal joint in the male, and in the female

by about three-fourths times the length of this joint or by a distance subequal to the vertical width of their upper lobes. Antennae very slender, more than three-fourths the length of the body in the male, the tenth joint four times as long as wide; in the female somewhat shorter, tenth joint fully three times as long as wide.

Prothorax distinctly narrowed in front, widest not far behind the middle in the male, at about the basal third in the female; sides strongly rounded at point of greatest width; dark areas densely punctate, pale areas smooth or sparsely punctate, interspaces sparsely minutely punctulate; side margins impunctate, more broadly so posteriorly; M broad and entire leaving three rather small elongate discal pale spots and the side margin yellow, the latter wider at front angles and extending narrowly along the anterior margin.

Elytra a little wider than the prothorax in the female, scarcely at all so in the male, punctuation moderately dense and broadly confused on the disk, the third and fourth striae not impressed but traceable nearly throughout in the male, less distinct in the female, fifth and sixth intricately confused, seventh irregular or interrupted, eighth entire and impressed; marginal interspace impunctate (♀), a single puncture at middle in the male type; shield large broadly subtriangular; maculation irregular, the lateral standard spots separated by irregular pale areas, the discal spots diffuse and confluent, the shield yellow and conspicuous.

Pygidium black and yellow; body beneath blackish, last ventral segment yellow in apical half. Front femora yellow, middle and hind femora with median dark spots; tibiae dusky, sometimes in part pale.

Length 3.7 to 3.8 mm.; width 2 to 2.15 mm.

Distribution.—*Texas*: Green Valley, Chisos Mts., Brewster Co., July 15 (type ♂); Chisos Mts., July 23 (♀). A single pair collected by Mr. H. A. Wenzel.

54. ***Pachybrachys illectus*** new species

Brown and yellow mottled, finely alutaceous; eyes separated in the male by barely the length of the basal antennal joint, and by about one and three-fourths times the length of the basal joint in the female; front without ocular lines; front claws of male very large. Ave. length 2.75 mm. Florida.

Head not very closely somewhat unevenly punctate, front predominantly yellow, the median line and a rather large vertex spot brown; eyes not prominent; antennae about two-thirds (♂) or one-half (♀) the length of the body, yellow, the apices of the outer joints dusky, tenth joint barely three times as long as wide (♂) or slightly shorter (♀).

Prothorax of moderate length (♂), or rather short (♀), widest and broadly very obtusely subangulate near the basal fourth, sides nearly straight and not strongly convergent in front; punctuation uneven, closer in the dark areas, side margins narrowly smooth; M brown, consisting of broad nearly entire but somewhat irregular lateral areas, imperfectly connected at apex with an entire median stripe which is wider in its anterior half and divided in front by a fine yellow line.

Elytra confusedly punctured in a not very large baso-sutural triangle, elsewhere with distinctly impressed rather coarsely punctate undulating striae, of which the fourth and fifth are most irregular; intervals convex, rather narrow, the marginal one with a single puncture behind the subbasal interruption; shield small; markings brown and yellow mottled, the colors about equally divided, the outer standard spots definable, the inner ones much broken up.

Pygidium brown and yellow, the colors not sharply limited. Body beneath brown with last ventral in great part yellow. Legs rufo-testaceous, the femora with paler tips.

Length 2.7 to 2.8 mm.; width 1.4 to 1.6 mm.

Distribution.—*Florida*: Enterprise, May 20; one pair in the Hubbard & Schwarz Collection (type ♂), now a part of the National Museum Collection.

55. ***Pachybrachys proximus*** Bowditch

Pale yellow, with typical marginal elytral spots indicated, but small. Head wider than the elytral apex; front flat, finely alutaceous, without ocular lines; eyes (♂) separated by about one and one-third times the length of the basal antennal joint. Prothorax finely alutaceous, moderately thickly but unevenly punctate, sides rather narrowly smooth; elytra minutely wrinkled, moderately shining. Front claws of male distinctly enlarged. Length 2.5 mm. Utah.

The above notes—for the most part supplementary to the original description—were drawn from the unique type several years ago, and I have seen nothing since which seemed identical. Following is Bowditch's description.

"Medium sized, cylindrical, pale yellow, with livid clouds and punctures. Length $2\frac{1}{2}$ mm.

"*Head* with pubescent and nearly flat front, punctured, with heavy frontal and vertex marks, the former divided so as to include the roots of the antennae, which are quite dark throughout, but have the basal joints somewhat brown-red, and reach a little beyond the middle of the body; eyes distant (♂), thorax yellow, wider than long, narrowed at front and also a little at rear, in its greatest length not quite half as long as the elytra, thickly but unevenly, finely, livid-brown punctured, M diffusely indicated by the thickening of the punctures, which leave the edges more or less free, especially the sides and anterior angles, lateral edge subangulate and well forward of the middle, transverse impression not well defined; elytra parallel, pale yellow, with moderate livid-brown punctures, which are diffused on the anterior half up to about the eighth interval, except that the third and fifth intervals are narrowly complete to the base and show a well marked triangular shield, the rear and side is regularly striate punctate, the color from the punctures more or less suffusing the intervals, the exterior standard spots also show faintly in livid, marginal striae lightly curved and barely sinuate, lobe well developed, with a strong row of

marginal punctures, body below very dark brown, with the usual parts picked out in dark red, legs light reddish yellow, with light ends to femurs and shanks.

"One ♂, Leeds, Utah. Type coll. Bowditch.

"As compared with *longus* the thorax is more transverse and not as long; the eyes in *proximus* are much more distant and the antennae and body below darker. The punctuation of the elytra is very similar."

56. ***Pachybrachys nunenmacheri*** new species

Yellow, with red-brown to dark brown standard markings and brown elytral striae; eyes separated by a distance which is a little less in the male, and a little greater in the female than the vertical width of their upper lobes; front without ocular lines; front claws of male moderately enlarged. Ave. length 2.9 mm. Extreme southern portions of Arizona and California.

Head not wider than the thoracic apex, markings rather broad, punctuation uneven, close in the darker areas. Eyes separated by the length of the first two antennal joints in the male, and by about two and one-half times the length of the basal joint in the female. Antennae moderate, outer joints darker, tenth joint three times as long as wide in the male, a little less elongate in the female.

Prothorax widest at basal two-fifths, obviously though not strongly narrowed in front, sides rather strongly rounded posteriorly, incurved at base, not distinctly sinuate before the angles; the M moderate to heavy, more or less diffuse; punctuation dense in the dark areas, elsewhere sparser, with small scattered smooth spots of lighter color; side margins smooth.

Elytra not very much wider than the prothorax, punctuation confused in the baso-sutural region, striae two to four variable, one or more of these nearly entire, five and six much confused except on the convexity, seven and eight entire, the latter with the usual subbasal interruption; marginal interspace impunctate or with but two or three punctures near the subbasal interruption in the male, more numerous punctate in basal half in the female; shield small, sometimes entirely undefined; spots rather small, those of the outer series distinct, the middle and posterior inner spots usually more or less confluent, the basal one sometimes wanting.

Pygidium blackish brown with the usual confluent apical pale spots. Body beneath brown with the last ventral segment and sometimes the sides of the abdomen pale. Legs yellow, with median parts of femora and tibiae dark; front thighs mostly dark with a small pale spot at middle.

Length 2.7 to 3.1 mm.; width 1.4 to 1.75 mm.

Distribution.—*Arizona*: Nogales (type ♂), Aug. 18 to Sept. 22 (Nunenmacher); Santa Rita Mts., 5,000 to 8,000 ft. (Snow).

With the above I have associated two examples—male and female—taken at or near San Diego, California, by Professor Wickham. They have the elytral spots somewhat less distinctly marked, especially in the female, and in the male the eyes are a little more prominent than the thoracic apex.

57. **Pachybrachys fortis** new species

Large, robust, yellow, with standard markings, in pale brown, rather lightly indicated on the elytra; lustre dull, surface with very fine, short and sparse pubescence; no ocular lines; front claws of male rather large. Ave. length 4.7 mm. Southern Arizona.

Head flat, impressed along the median line, densely punctate in the large dark areas, with smaller yellow subimpunctate spots. Eyes separated by from one-fifth to about one-third more than the length of the basal antennal joint in the male, and by rather more than twice the length of this joint in the female. Antennae very slender, fully three-fourths the length of the body in the male, and passing the middle in the female; outer joints blackish, the tenth more than four times as long as wide.

Prothorax widest at about basal two-fifths, sides nearly straight and moderately convergent in front, a little convergent behind and with a slight sinuation before the hind angles; punctuation fine, dense in the more heavily shaded areas, sparse in the unshaded portions but extending to the side margins; basal portions of the M broadly distinct, the apical portions lighter and evanescent anteriorly.

Elytra fully twice as long as the prothorax and more coarsely punctured; punctures confused in the baso-sutural region, elsewhere generally serially arranged, the striae in part entire, in part interrupted, notably striae four to six in front of the middle; eighth stria sinuate behind the humerus; marginal interspace with numerous punctures in basal half; shield small or nearly wanting.

Pygidium brown and yellow; body beneath brown, with abdominal apex pale. Legs pale, with median darker shades on both femora and tibiae.

Length 4.5 to 5 mm.; width 2.3 to 2.75 mm.

Distribution.—*Arizona*: Nogales, 4,000 ft., Aug. 15 (Nunenmacher). Type (male).

Two males and one female of this fine species are before me, for which I am indebted to Mr. Nunenmacher, in whose collection are further specimens. It is most likely to be confused with *crassus* and has been referred to under that species. The eyes are more approximate in *crassus*, nor have I seen any indication in that species of the short pubescence which is noticeable in all of the specimens of *fortis*. In *crassus* the serial punctures along the side margin of the prothorax are uncolored or nearly so and from sixteen to nineteen in number, while in *fortis* these punctures are brown and about twenty-three in number. I have for the present associated two smaller females taken also at Nogales by Mr. Nunenmacher. These are three and three and one-half

mm. long, very similar in nearly every respect, but the eyes seem slightly more distant and there is no trace of the short sparse pubescence seen in typical *fortis*, though this I suspect may easily be lost by abrasion.

58. **Pachybrachys femoratus** Olivier

Small to medium in size, females quite robust, blackish and dull yellow, mottled, the darker color usually in excess on the prothorax, and often on the elytra; punctuation rather dense, broadly confused on the elytral disk; no ocular lines; front claws of male distinctly enlarged. Ave. length 2.75 mm. Atlantic Coast and Gulf States.

Head not wider than the thoracic apex, blackish markings more or less broad and closely punctate, yellow areas sparsely so. Eyes separated by the length of the basal two joints of the antennae in the male and by twice the length of the basal joint in the female. Antennae one-half (♀) or two-thirds (♂) the length of the body, dull yellow basally, tenth joint scarcely more than twice as long as wide.

Prothorax distinctly narrowed in front, widest and rather strongly rounded before the base, especially in the male, sides a little incurved before the hind angles; markings broad and diffuse, pale areas usually small and a little convex, the punctuation dense in the dark spaces; side margins not smooth or only partially and very narrowly so.

Elytra broadly confusedly punctate baso-medially, elsewhere with irregular unimpressed series of punctures, becoming lightly impressed striae only at the sides and on the rear convexity; shield small and in some examples scarcely defined; marginal interspace narrowed apically, not wider than the adjacent one, more or less punctate (rarely almost impunctate) in the male, in the female punctate almost or quite throughout, the punctures of the interval frequently confused with those of the stria basally; maculation variable, the standard spots—especially the inner ones—poorly defined.

Pygidium black with two oblique apical spots, often confluent at their tips, and a small spot at the middle of each side margin, yellow; this latter contiguous to a yellow spot at the side of the last abdominal segment, the abdominal spot sometimes produced along the apical margin of the segment. Legs yellow, femora and tibiae with black or brown more or less diffuse median spots.

Length 2.6 to 3 mm.; width 1.45 to 1.75 mm.

Distribution.—*New York*: West Hebron, June 20, and Staten Island (Leng); Coney Island, June 29 (Nat. Mus. Coll.). *New Jersey*: Ocean Co. (Leng Coll.). *North Carolina*: (Leng Coll.). *South Carolina*: (Liebeck Coll.). *Georgia*: (Nat. Mus. Coll.). *Florida*: (Nat. Mus. Coll.); Key West (Leng Coll.); Enterprise (Laurent). *Alabama*: Mobile and vicinity, April and May, "on oak" (Loding). *Texas*: Dallas (Blanchard Coll.).

The locality named by Olivier in his original description is "Carolina." Haldeman says "Middle and Southern States," and adds, "In Pennsylvania it appears in June and July on trees of the genus *Carya*." It is by no means certain, however, that Haldeman's *femoratus* is the species here described, his characterization being short and about equally applicable to several other Atlantic Coast species. For the same reason Olivier's description is of little value and I have thought it the best course to accept as *femoratus* the species so labeled in the LeConte Collection. This agrees well enough with the original description as well as with those of Haldeman and Suffrian, and is a common species in the region from which Olivier's type is reported to have come.

In the northeastern States the following variety to a large extent replaces the more typical form of the southern States.

Var. **aquilonis** new variety

Legs darker, sometimes almost entirely black, the hind tibiae quite constantly dark brown or blackish throughout, while in true *femoratus* they are always yellow in about the basal half and more or less so at apex. The black color is more strongly predominant as a rule (though with numerous exceptions) than in typical *femoratus*, the pale spots of the pygidium smaller and often absent, and that at the side of the last abdominal segment is here rarely present (constantly present in true *femoratus*).

Distribution.—*Massachusetts*: Framingham, June 2 (type ♂), also May 23, beating oak (Frost); Tyngsboro, July 17; Melrose Highlands, June 17 (D. H. Clemens in Nat. Mus. Coll.); Marion, on oak (Bowditch); Winchester, June 15 (Blanchard). *Rhode Island*: Berkeley, June 17, on oak. *New York*: (Nat. Mus. Coll.). *New Jersey*: Anglesea, May 30 (Wenzel). *Pennsylvania*: Carlisle Junction, June 27 (Fisher?). *Virginia*: A ♂ in my own collection without definite locality.

59. **Pachybrachys characteristicus** Suffrian

Dull grayish or whitish yellow, thickly speckled with brown or fuscous diffused punctures, and with brown or fuscous markings which are very variable in extent and distinctness, elytral striae indistinct and unimpressed except on the convexity; lateral interspace as a rule wider posteriorly than the next inner one; other characters as in *femoratus*. Ave. length 3 mm. Florida.

This species is very closely related to *femoratus* and there is little to add in the way of distinction to the above diagnosis. The color when not obscured by the markings is distinctive; the standard M is sometimes nearly fuscous in color and is then quite sharply outlined; more often, however, it is of some

shade of brown and quite diffuse, in some specimens suffusing the entire disk. The standard spots are sometimes moderately distinct along the elytral margin, the inner ones, however, rarely if ever so, the two anterior ones frequently absent, and broadly suffused if present; the posterior one apparently always present and more or less confluent with the marginal spot to form a more or less defined transverse fascia on the convexity. The punctuation is even more diffuse than in *femoratus*, but varies much. In some females the punctures are broadly confused over the greater portion of the surface, there being but faint evidences of striae and these only at the rear; in other examples the lines of punctures are more evident, but they—including even the submarginal stria—are not appreciably impressed, or at most only lightly so behind. The lateral interspace is almost always wider than the adjacent one, and this though a somewhat trifling character is perhaps one of the most reliable.

Length 2.8 to 3.2 mm.; width 1.5 to 1.8 mm.

Distribution.—*Florida*: Lake Mary; Haulover, Mar. 10 (Schwarz); Enterprise (Liebeck Coll.); Key West and "P. Orange," Mar. 17 (Leng Coll.); Jacksonville (Ashmead—in Nat. Mus. Coll.).

My conception of this species is based on a Suffrian type sent to Bowditch, and all similar examples thus far seen by me are from Florida. This Suffrian type looks quite different from the darker northern form of *femoratus*, but toward the south the two approach each other so closely that it is next to impossible to draw any definite line between them, and it may yet be necessary to reduce *characteristicus* to varietal standing.

60. *Pachybrachys subfasciatus* LeConte

Black, prothorax with sides, and elytra with a more or less broad irregular or indented transverse median fascia often interrupted at suture, and apical spot, red or yellow; disk of prothorax often, and head more rarely variegated with reddish yellow. Eyes distant by but little more than the length of the basal antennal joint in the male, and by about twice the length of the basal joint in the female; front without ocular lines; front claws of male distinctly enlarged. Ave. length 3 mm. Massachusetts to Missouri and Louisiana.

Head not at all wider than the thoracic apex, moderately closely punctate, usually entirely black, rarely—especially in the male—with pale markings. Eyes much less widely separated than the vertical width of their upper lobes in the male, a little more widely distant than the width of the upper lobes in the female. Antennae three-fourths (σ^7) or one-half (♀) the length of the body, tenth joint three times as long as wide or a little less in the male, basal and outer joints blackish.

Prothorax distinctly narrowed in front, sides rounded posteriorly, rather coarsely somewhat unevenly punctate, the sides at most very narrowly or indistinctly smoother, the pale margin narrowed behind, and sometimes almost lacking.

Elytra more minutely alutaceous and somewhat less opaque than the prothorax, coarsely rather densely punctate, with more or less impressed striae at sides and rear; one or two narrow slightly elevated discal costae usually visible in the female; shield inconspicuous; marginal interspace wide, punctate, more numerous so basally.

Pygidium, body beneath and legs black, the latter often with the tibiae picco-testaceous, especially of the anterior legs; base of femora sometimes gradually paler. Front claws of male quite noticeably enlarged though less strongly so than in *limbatus*.

Length 2.75 to 3.25 mm.; width 1.4 to 1.8 mm.

Distribution.—*Massachusetts*: Melrose Highlands, May 23 (D. H. Clemons in Nat. Mus. Coll.); Marion, June 17 (Bowditch); "Mass." (many collections). *Connecticut*: (no definite locality). *New York*: New York City and vicinity (Leng); Staten Island (Soltau in Nat. Mus. Coll.); Peekskill, May (Sherman). *New Jersey*: Orange (Soltau); Spotswood (Leng); So. Orange, June 22 (Leng); Ateo, June 2 (Boerner); Da Costa, June 12 (Wenzel); "N. J." (Liebeck); Woodbury (Wenzel). *Pennsylvania*: Allegheny, May and June (Hamilton); Jeanette (H. G. Klages); Pa. (Liebeck). *Maryland*: Plummer's Island, May (Schwarz and Barber). *District of Columbia*: Washington, May 16 (Hubbard & Schwarz). *Virginia*: (Beyer). *Ontario*: (Nat. Mus. Coll.). *Michigan*: Detroit, June and July (Hubbard & Schwarz). *Ohio*: Cincinnati (Dury); "Ohio" (Liebeck Coll.). *Kentucky*: near Cincinnati, June 21 (Dury); Frankfort, June 6 (Soltau in Nat. Mus. Coll.). *Indiana*: (Liebeck Coll.); Blatchley gives "Marshall, Vermillion and Lawrence Cos.; scarce May 11–June 14." *Illinois*: So. Ill. (Nat. Mus. Coll.). *Missouri*: C. Mo. (Nat. Mus. Coll.); St. Louis (Nat. Mus. Coll.); Mo. (Liebeck Coll.). *Louisiana*: Opelousas, Apr. 7 (Wenzel).

A common species in the eastern United States and one that is easily recognizable—at least in the Atlantic region. It seems rather more variable in the Mississippi Valley, and the various forms of *impurus* which do not seem to differ from it structurally may really be only still more diverse color phases of this species.

61. ***Pachybrachys impurus*** Suffrian

Of medium size, markings broad and diffuse, dark brown to fuscous in the male, ferruginous in the female, front between the eyes but little wider than the length of the basal antennal joint in the male, ocular lines wanting; elytral striae much confused,

front claws of male distinctly enlarged. Ave. length 3 mm. Illinois to Nebraska and Texas.

Head not wider than the thoracic apex, front closely punctate in the broad confluent markings, eyes separated by one and one-fourth to one and one-third times the length of the basal joint of the antennae in the male, and by twice the length of the basal joint or slightly more in the female. Antennae moderate, fully attaining the hind coxae in the male, outer joints dusky.

Prothorax distinctly narrowed in front, rather strongly rounded posteriorly, especially in the male, sides slightly briefly sinuate immediately before the hind angles, punctuation rather dense in the heavily marked shades representing the M, the smaller pale areas, including the side margins, sparsely punctate.

Elytra broadly confusedly punctate baso-medially, the striae elsewhere in great part more or less irregular or fragmentary, eighth stria sinuous but well defined in the male, sometimes a little confused in the female; marginal interspace punctate, more numerous and completely so in the female; shield small and inconspicuous as a rule, sometimes obsolete.

Pygidium marked as usual. Body beneath (σ) blackish, except the abdominal apex; (♀) ferruginous with the abdominal margins or even the whole abdomen paler. Legs rufo-testaceous to yellow with darker or blackish median femoral and tibial spots.

Length 2.75 to 3.2 mm.; wider 1.4 to 1.7 mm.

Distribution.—*Texas*: (type ♀). *Kansas*: Onaga (Crevecoeur). *Iowa*: Iowa City, May and June (Wickham); Elma, June 30 (Snow Coll.). *Illinois*: Algonquin, June 10 (Nason); So. Ill. (Soltau—Nat. Mus. Coll.), almost precisely like the Suffrian type sent me by Professor Tasehenberg.

Var. **xanthias** Suffrian

Yellowish, with slightly darker vague and diffuse rufo-testaceous or rust colored shades. This is nothing more than a paler nearly uniformly colored *impurus*, and all specimens seen by me are females.

Distribution.—The type localities are Pennsylvania and Missouri. I have never seen a specimen of the true *impurus* or the form *xanthias* from the Atlantic Slope and it is not unlikely that Suffrian has mixed two species under this name. An example from Nebraska in my collection is almost exactly like the Suffrian specimen sent me by Tasehenberg, and others from Iowa City, Algonquin, Ill., and West Point, Neb., differ but slightly. Before receiving this type from the Suffrian Collection for study, I had—in common with Bowditch—provisionally identified as *xanthias* the *diversus* new species of the present paper. This latter, however, is abundantly distinct from the true *xanthias* by its more shining surface, better marked elytral striae, distinct ocular lines, and less enlarged front claws of the male.

Var. **umbrosus** new variety

Upper surface black with a few very small scattered yellowish spots; head and legs obscurely variegated with dull yellow. An extreme melanic variety or race which superficially may very easily be confused with a number of other species unless careful attention be given to the characters.

Distribution.—The type is one of two males from Salina, Kansas, sent me by Mr. Knaus.

This species is allied very closely indeed to *subfasciatus*, in fact there is in the females a complete gradation in color from *subfasciatus* through *impurus* to *xanthias* with apparently absolutely no structural differences in either sex. It must, however, be stated that all males that I have seen are either of the typical *subfasciatus* form (including of course variations in the development of the pale elytral fascia and spots), or they are of the fusco-variegated form of the male of the true *impurus* including the melanic extreme—*umbrosus*. *Impurus*, *xanthias* and *umbrosus* are almost surely forms of one variable species, but until the males are more perfectly connected I do not feel quite safe in uniting them with *subfasciatus*.

62. **Pachybrachys calidus** new species

Dull yellow with rather broad fuscous markings, surface finely alutaceous but frequently somewhat shining; eyes separated in the male by about one-half the vertical width of their upper lobes, and in the female by somewhat less than the width of their upper lobes; ocular lines fine, quite near the eyes; marginal interspace of the elytra nearly or quite impunctate; front claws of male only slightly larger than the others. Ave. length 3.1 mm. Western Texas to Arizona.

Head not wider than the thoracic apex, moderately punctate, median line feebly or scarcely impressed, markings variable. Eyes separated in the male by the length of the basal antennal joint, in the female by the length of the first two joints or a little more. Antennae (σ^7) attaining the hind coxae, a little shorter in the female, the tenth joint scarcely more than two and one-half times as long as wide in either sex; outer joints infusate as usual.

Prothorax rather strongly transverse in the female, distinctly narrowed in front, widest behind the middle; sides moderately arcuate, more strongly so in the male; punctuation close in the dark areas, side margins smoother; M broad, extending from base to apex leaving two basal spots, a median line in front, and the side margins pale.

Elytral striae somewhat impressed and distinct outside of the baso-sutural triangle; striae five to six often more or less broken at middle; shield distinct.

triangular; marginal interspace impunctate in the male, often with one or two punctures at middle in the female; spots moderate in size to rather large, usually quite distinct, but with some tendency to diffusion.

Pygidium almost entirely dark or with varyingly developed apical pale spots. Body beneath fuscous, the abdominal apex pale. Legs pale with small median darker spots or shades on femora and tibiae, these sometimes almost obsolete.

Length 2.8 to 3.4 mm; width 1.45 to 1.85 mm.

Distribution.—*Texas*: El Paso, April (Fenyes), type ♀. *New Mexico*: (Nat. Mus. Coll.). *Arizona*: Santa Rita Mountains, Apr. 17 (Clemence); Catalina Springs, Apr. 12 to May 7 (Hubbard & Schwarz); "Ari" (Morrison—Nat. Mus. Coll.), (Leng Coll.), (Schaeffer Coll.).

63. *Pachybrachys brevicornis* new species

Robust, yellow, with more or less heavy fuscous standard markings; eyes moderately distant, front with ocular lines; antennae unusually short (♀); elytra strongly striate; front claws of male not appreciably enlarged. Ave. length 2.9 mm. Texas.

Head moderate in size but with the eyes rather prominent, standard spots usually small or wanting except the one on the vertex, which is well developed. Eyes (♀) separated by rather more than twice the length of the basal antennal joint. Antennae (♀) short, scarcely passing the shoulder knob, the tenth joint scarcely twice as long as wide; outer joints infuscate.

Prothorax strongly transverse, widest at basal third, or two-fifths, sides rather strongly rounded and strongly narrowed in front; punctuation close, dense in the dark areas, the latter usually broad leaving the side margins and three discal spots pale; punctuation less dense along the margin, which is narrowly smooth posteriorly.

Elytra diffusely punctate in a not very large basal-sutural triangle, elsewhere with distinct striae which are rather strongly impressed laterally, the fifth and sixth more or less broken or irregular at middle, the eighth with a subbasal dislocation; marginal interspace impunctate; shield conspicuous, elongate triangular. The color may be described as yellow with more or less heavy confluent standard spots which vary from brown to nearly black; or as brown or blackish with the basal margin, some short spurs extending backward from it, two short interrupted lateral transverse fasciae, the shield, and the apex, yellow.

Pygidium brown or fuscous with or without the usual yellow spots. Body beneath brown to fuscous with the last ventral in part yellow. Legs brownish yellow, with darker femoral rings or clouds varying in intensity.

Length 2.75 to 3.1 mm. width 1.5 to 1.8 mm.

Distribution.—*Texas*: Goliad, Apr. 18 (Schwarz); Cypress Mills, May 26 (Leng Coll.). The type is labeled simply "Tex," as are other examples in the Leng and Liebeck Collections.

The type and all other specimens but one are females; this one being a male from Brownsville which is doubtfully referred. In it the eyes are separated by a distance just visibly greater than the length of the first two antennal joints, and on this character the species is given the place it occupies in the table. In appearance it is more like *calidus*, in which, however, the eyes are very distinctly more approximate. The front claws of the Brownsville male are not appreciably enlarged nor is any such modification indicated for the male by the size of the front claws in the female.

64. ***Pachybrachys prosopis*** new species

Dull flavous to rufo-testaceous, variably maculate with brown or fuscous; eyes in male separated by the vertical width of their upper lobes; ocular lines fine but evident; elytral striae fairly regular; front claws of male only slightly larger than the others. Ave. length 2.6 mm. Desert region of California and Arizona.

Head coarsely somewhat irregularly punctate, ocular lines rather fine, more distant from the eyes than in *calidus*. Eyes separated in the male by the length of the first two antennal joints, and in the female by two and one-half to nearly three times the length of the basal joint. Antennae short, in the male not passing the hind coxae, in the female scarcely half as long as the body, tenth joint not or scarcely more than twice as long as wide, at least in the female.

Prothorax a little narrowed in front, more coarsely punctate than in *calidus*, the M very variable in development, sometimes almost obsolete, sometimes by diffusion involving almost the entire disk, usually rather broad and not as sharply defined as in *calidus*. Elytral markings similarly variable, the spots typically well developed nearly as in *calidus*, but in some males much reduced; surface striate except in the baso-sutural triangle, the striae more or less sinuous but entire, some or all of striae four to six, however, more or less interrupted or broken at middle; shield rather large and conspicuous, subtriangular; marginal interspace nearly or quite impunctate.

Pygidium, under surface and legs as in *calidus*.

Length 2.3 to 3 mm.; width 1.2 to 1.65 mm.

Distribution.—*California*: Palm Springs, April (type ♀) on mesquite; Yuma, April (Fenyess); Inyo Co. (Rieksecker); Death Valley, April (Koebele in Nat. Mus. Coll.); S. E. Cal. (Am. Ent. Soc. Coll.). *Arizona*: Laguna Dam, Mar. 10 (Clemence); "Ari." (Morrison—Nat. Mus. Coll.).

This species, as indicated in the description, is similar in many ways to *calidus*. It is on the average a distinctly smaller insect, relatively more coarsely punctured, apparently more variable in color, with more widely separated eyes and larger elytral shield.

65. **Pachybrachys wenzeli** new species

Robust, varying from almost entirely black to yellow, more or less heavily maculate and irrorate with black; prothoracic punctuation nearly equally dense to the extreme margins, elytral punctuation largely confused; eyes in the male less distant than the vertical width of their upper lobes; front without ocular lines; front claws of male a little larger than the others. Ave. length 3.8 mm. Arizona to El Paso, Texas.

Head not wider than the thoracic apex, markings heavy, sometimes so broadly diffused as to leave only a few small yellow spots, the dark areas densely punctate. Eyes in the male separated by about four-fifths the width of their upper lobes, or by the length of the basal two joints of the antennae or slightly more, in the female by a distance greater than the width of their upper lobes or rather more than twice the length of the basal joint of the antennae. Antennae fully three-fourths as long as the body in the male, the tenth joint about three times as long as wide, shorter as usual in the female, pale at base, outer joints dusky.

Prothorax moderately transverse, relatively a little longer and more dilated posteriorly in the male, distinctly narrowed in front, sides strongly rounded behind the middle, especially in the male, widest at about basal third, punctuation dense throughout, side margins not smoother; M heavily marked, leaving three discal spots and side margin yellow, the discal spots sometimes reduced to mere dots, or the surface may become entirely black.

Elytra but slightly wider than the prothorax, densely more coarsely punctate than the latter, striae scarcely evident except along the side margin and some short remnants on the rear convexity; shield wanting; eighth and sometimes the seventh stria distinct and more or less impressed; marginal interspace punctate; markings heavy, the lateral spots usually separable, the inner ones less distinct and more or less diffuse and connected with each other or with the lateral spots; entire surface sometimes black irrorate with numerous small yellow spots, or occasionally entirely black.

Pygidium black, with or without apical yellow spots; body beneath black, the last ventral segment sometimes margined with yellow. Legs variable, thighs yellow with blackish spots, the tibiae pale at base, in the lighter colored examples; in the darker ones the legs may be black with the femora at base alone paler.

Length 3.4 to 4.3 mm.; width 1.9 to 2.6 mm.

Distribution.—*Arizona*: This is apparently an abundant species in the Huachuca, Chiricahua and Santa Rita Mountains of Southern Arizona, where it has been taken by H. A. Wenzel, Skinner, Beyer, Schaeffer, Snow, Hubbard and Schwarz and perhaps others—May to August. The type (σ) was taken by Wenzel in the Huachuca Mountains. The following localities are also represented: Williams, May and June (Nat. Mus. Coll.), also collected by myself, July 3; Prescott (Snow Coll.); Pinal Mountains (Wickham). *New Mexico*: Silver City (Dury). *Texas*: El Paso (Am. Ent. Soc. Coll.).

In this species the head and especially the prothorax are distinctly alutaceous, and the latter shows scattered minute punctures between the larger punctures. The elytra are moderately shining and barely detectably alutaceo-rugulose.

66. **Pachybrachys snowi** Bowditch

Large, robust, yellow with red-brown to piceous markings; eyes in male separated by one-half the vertical width, and in the female by scarcely the width of their upper lobes; front without ocular lines; lateral interspace of elytra impunctate behind the subbasal interruption; front claws of male a little enlarged. Ave. length 4.4 mm. Arizona.

Head with the usual marks, broader and more diffuse in the female with correspondingly more diffuse punctuation. Eyes (σ) separated by the length of the basal joint of the antennae, in the female by one and three-fourths times the length of the basal joint or a little more. Antennae short, scarcely passing the humeral umbo in the female; about two-thirds the length of the body in the male; tenth joint three times as long as wide.

Prothorax moderately (σ) or more strongly (♀) transverse, narrowed in front, rather strongly rounded at sides behind the middle, especially in the male; surface very minutely alutaceous and moderately shining, punctuation rather fine, not dense, though somewhat closer in the darker areas, a narrow smooth median line in anterior half; the side margins smooth, more broadly so behind; M rather broad, somewhat broken but with distinct outlines.

Elytra very little wider than the prothorax, punctuation coarser than in the latter, broadly confused on the disk, serially arranged on the convexity and with the two outer striae distinct, only lightly impressed; shield undeveloped or small and inconspicuous. Standard spots evident, the lateral ones well marked; the front one of the inner series diffuse and indistinct, the other two elongate, the middle one extending back and joining the posterior one on its outer side, the effect being to form a broken posterior fascia on the convexity.

Pygidium brown with yellow apical spots. Body beneath red-brown, the last ventral segment more or less yellow. Femora yellow with dark rings; tibiae brownish yellow, paler at base.

Length 4 to 4.75 mm.; width 2.2 to 2.7 mm.

Distribution.—*Arizona*: Bowditch reports it from Baboquivari Mountains, Santa Rita Mountains, Douglas and Prescott. Specimens are before me from the first two named localities from the Snow and National Museum Collections respectively, also from the Huachuca Mountains (Beyer), and a specimen from Wickham labeled "Riverside to Tucson."

67. **Pachybrachys turbidus** LeConte

Medium to large, yellow with red-brown markings which may become nearly black on the elytra; elytral striae deep with convex intervals; surface shining though minutely alutaceous; front

without ocular lines; eyes separated by the length of the basal joint of the antennae in the male; front claws of male slightly larger. Ave. length 4 mm. Kansas to Texas.

Head moderate, punctuation close, a little uneven in distribution, markings variable, usually more distinctly defined in the male, broader and diffuse in the female, sometimes almost uniformly rufous (σ^7 ♀). Eyes in the male separated by the length of the first antennal joint, in the female by one and three-fourths to nearly twice the length of the basal joint. Antennae very slender, fully three-fourths the length of the body in the male, tenth joint more than three times as long as wide.

Prothorax widest at basal one-third or two-fifths, much narrowed in front, strongly rounded at sides behind the middle, punctuation rather coarse, fairly close in the darker areas, elsewhere sparser, side margins narrowly smooth anteriorly, more widely so behind; markings as a rule very broad and quite diffuse; sometimes involving the whole disk, leaving only the side margins pale, the anterior angles more broadly so.

Elytra very coarsely punctate, closely diffusely so in the scutellar region, striae rather deeply impressed throughout, the first terminating anteriorly at the shield, two and three entire, four variable, five and six distinct in posterior half, seven and eight entire; marginal interspace impunctate, all the intervals convex, strongly so at sides and posteriorly; shield subtriangular, more or less distinct; standard spots more or less defined, the anterior two and likewise the posterior ones usually subcoalescent to form two more or less irregular transverse fasciae.

Pygidium red-brown and yellow, the latter predominating. Body beneath reddish brown, last ventral segment pale at apex. Legs rufo-testaceous throughout, or yellowish with the middle and hind thighs faintly clouded with rufous.

Length 3.7 to 4.3 mm.; width 2 to 2.45 mm.

Distribution.—*Texas*: (Type—LeConte Coll.); (Belgrave—Nat. Mus. Coll.); "P. Saddle" (Leng Coll.); Round Mountain, and Seabrook, Aug. 9 (Wenzel). *Kansas*: Douglas Co.; 900 ft. (Snow); Onaga (Wickham Coll.); Salina (Knaus); "Kans." (various collections).

68. *Pachybrachys laticollis* Jacoby

Size large, reddish brown variegated with numerous small yellow spots, lustre dull; eyes separated in the female by a distance subequal to the vertical width of their upper lobes, front without ocular lines; elytra deeply striate at sides and behind; front claws of male probably distinctly enlarged (not yet seen). Ave. length 4 mm. Texas and Arizona.

Head moderately punctate, yellow with broad reddish brown markings; eyes (♀) separated by barely twice the length of the basal antennal joint; antennae (♀) about three-fifths the length of the body, paler toward the base, tenth joint scarcely two and one-half times as long as wide.

Prothorax rather long, nearly as wide as the elytra, sides, subparallel or

slightly convergent posteriorly from the basal third, quite strongly so in front, standard markings broadly suffusing the disk, punctuation rather fine and very dense, disk with small scattered slightly more convex smooth yellow flecks; narrowly smooth or sparsely punctured along the side margins.

Elytral punctuation coarser than that of the prothorax, densely confused in a broad baso-sutural triangle, sides and rear striate, the striae deep and nearly regular on the convexity; marginal interspace punctate in basal half; shield small, sometimes indistinct.

Pygidium yellow with basal margin and median spur brown; body beneath brown, last ventral segment in part yellow. Front thighs brown, paler basally, middle and hind thighs rufo-testaceous with broad black rings; tibiae brownish, paler toward the base.

Length 4 to 4.25 mm.; width 2.3 to 2.35 mm.

Distribution.—*Texas*: Brownsville, June (Schaeffer), April and May (Dury). *Arizona*: San Bernardino Ranch, Cochise Co. (Snow).

In the Arizona specimen the broad suffused markings are blackish fuscous instead of reddish brown but otherwise it seems identical. This species resembles *turbidus* in size and general facies but is more densely and less coarsely punctate, the baso-sutural area of confused punctures much larger, the lustre dull—moderately to distinctly shining in *turbidus*. The width of front between the eyes is a trifle less in *turbidus* in the female, and I suspect that males of the two species will not prove to be very different in this respect; on this assumption the present species is tabulated near *turbidus*.

69. ***Pachybrachys duryi*** new species

Yellow, brown punctate, thoracic M moderate, elytra with a common sutural spot on the convexity and some small marginal markings; front rather narrow, the eyes separated by a distance less than the vertical width of their upper lobes, even in the female; no ocular lines; front claws of male not appreciably enlarged. Ave. length 2.3 mm. Brownsville, Texas.

Head not appreciably wider than the thoracic apex, front sparsely punctate except in the median impressed line, markings small. Eyes separated by the length of the basal antennal joint in the male, and by the length of the first two joints in the female. Antennae moderate, outer joints dusky.

Prothorax distinctly narrowed in front, widest and moderately rounded at basal third, punctuation close in the dark areas, elsewhere sparse, side margins smooth. Elytra confusedly punctate in moderate baso-sutural area, striae two to three and seven to eight entire, the intermediate ones broken and very irregular; shield small, inconspicuous, marginal interspace without punctures, the eighth stria with a strong sigmoid dislocation; standard spots very obvious,

those of the marginal series small and rather sharply defined, dark brown, the two posterior connected; inner spots represented by vague diffuse brown shades, a darker sutural spot at the beginning of the declivity.

Pygidium brown and yellow. Body beneath dark brown with abdominal sides and apex pale. Legs pale with small diffuse slightly darker median clouds on the femora and tibiae.

Length 2.25 to 2.4 mm.; width 1.25 to 1.3 mm.

Distribution.—*Texas*: Brownsville, Apr. 12 to May 20 (Dury), type ♂; St. Tomas, Brownsville, April (Schaeffer).

This species may easily be confused with *texanus*, which occurs abundantly in the same region, but the latter has more approximate eyes, strongly modified male front tibiae, and the standard elytral spots are disposed as usual. The sutural spot on the convexity in *duryi* is not large, but is quite conspicuous, and will probably prove characteristic.

70. *Pachybrachys gracilipes* new species

Of medium size, rather brightly black and yellow mottled; eyes in the male separated by a distance which is less, and in the female more, than the vertical width of their upper lobes; no ocular lines; front tibiae scarcely widened apically; front claws of male small. Ave. length 2.85 mm. Western Texas.

Head not wider than the thoracic apex, markings light to heavy, punctuation close in the dark areas, elsewhere sparse. Eyes separated by one and one-third (♂) or one and three-fourths (♀) times the length of the basal antennal joint. Antennae thin, fully three-fourths the length of the body in the male, the tenth joint three times as long as wide; in the female scarcely more than half the length of the body; color yellow, outer joints blackish as usual.

Prothorax moderately narrowed in front, widest at basal third, sides broadly arcuate, slightly incurved basally; punctuation rather coarse and close in the dark areas, which vary much in development but are quite sharply defined and usually rather broad; side margins smooth.

Elytra with striae two to three and seven to eight entire and evidently impressed, the outer ones rather strongly so; striae four to six much broken or confused anteriorly, but distinct on the posterior convexity; shield distinct, convex, sub-triangular; marginal interspace without punctures, the submarginal stria deflexed to the margin behind the shoulder.

Pygidium black with the usual oblique converging yellow spots. Body beneath black, a yellow spot usually present at side of last ventral segment, and the sides of the abdomen sometimes narrowly yellow. Legs yellow with sharply defined black rings on the femora and tibiae.

Length 2.7 to 3 mm.; width 1.4 to 1.65 mm.

Distribution.—*Texas*: Alpine, 4,400 to 6,000 ft., June 28 to 30 (Wickham) type ♂; Davis Mountains, Chisos Mountains and Green Valley, Chisos Mountains, July 9 to 16 (Wenzel).

The front tibiae are not distinctly widened apically in this species, as they usually are, and the apical spur projects inward nearly at right angles to the axis of the tibia.

71. **Pachybrachys confederatus** new species

Yellow, with dark brown or fuscous standard markings, variable in development; eyes of male somewhat less distant than the vertical width of their upper lobes, in the female separated by a distance subequal to the width of their upper lobes; front without ocular lines; elytral striae impressed, more or less broken; front claws not appreciably enlarged in the male. Ave. length 2.9 mm. New York to North Carolina.

Head not appreciably wider than the thoracic apex, markings moderate to broad. Eyes separated by one and one-third to one and two-fifths times the length of the basal antennal joint in the male, and by the length of the first two joints or slightly more in the female. Antennae fully four-fifths as long as the body in the male, the tenth joint not much less than four times as long as wide, yellow with basal and outer joints more or less infuscate.

Prothorax moderately transverse, sides moderately arcuately narrowed from a little before the base; punctuation moderately coarse and close; M more or less broken and diffuse but usually rather broadly marked, and consisting of dark brown or fuscous spots overlaid upon still more vague and diffuse shades of paler brown; side margins not smooth or only partially and imperfectly so.

Elytral disk confusedly punctate in the baso-sutural region, striae distinctly impressed, especially at sides and rear, where they are well defined, becoming broken or confused at the middle of the disk; submarginal stria with strong subhumeral dislocation; marginal interspace impunctate or nearly so; shield small, yellow, and moderately convex; standard spots varying from rather small and well isolated to broad and more or less confluent.

Pygidium fuscous with the usual yellow spots. Body beneath blackish with sides of ventral segments—especially the terminal one—yellow. Legs yellow with broad median femoral and tibial fuscous rings or shades.

Length 2.8 to 3.1 mm.; width 1.5 to 1.6 mm.

Distribution.—*New York*: ♂ type, without definite locality, but probably from the vicinity of New York City. *Connecticut*: exact locality not indicated. *Virginia*: Pennington Gap, June 26 (Hubbard & Schwarz). *North Carolina*: Black Mountains, June (Van Dyke). *Missouri*: Kansas City, June (Mackenzie in Am. Ent. Soc. Coll.), 1 ♀, identity doubtful.

This species is very closely allied to and almost exactly identical in appearance to *relictus*, differing, however, in its distinctly less distant eyes, which fact of course accounts for its remoteness from the latter species in the tabular arrangement. The side margins

of the prothorax are more completely punctured here than in *relictus*, which has a fairly well defined smooth margin, and the front claws of the male are possibly a trifle larger, though small in both. The relation of *confederatus* to *tybeensis* is about equally close and the tabular characters seem to offer the only means of separation.

72. **Pachybrachys tybeensis** new species

Yellow, with reddish brown to dark brown punctures and indistinct markings; front between the eyes rather narrow, ocular lines wanting; front claws of male not enlarged. Ave. length 3 mm. Tybee Island, Georgia.

Head not wider than the thoracic apex (slightly so in one female), front moderately closely punctate, markings somewhat diffuse. Eyes separated in the male by a distance which is much less than the vertical width of their upper lobes, and exceeds but slightly the length of the basal antennal joint; in the female by a distance subequal to the width of their upper lobes and about one and two-thirds times the length of the basal antennal joint. Antennae very slender, outer joints more or less dusky, in the male fully three-fourths as long as the body, in the female but little more than half the length of the body, the tenth joint more than three times as long as wide in the male, a little shorter in the female.

Prothorax distinctly arcuately narrowed in front, widest just before the base, punctuation dense, rather coarse, with scattered small, smooth, more convex spots; side margins only very narrowly and incompletely smothered; markings red-brown, broad, very diffuse.

Elytra confusedly punctured in a rather narrow baso-sutural area, elsewhere with the punctures in broken or irregular series, of which the second and third are sometimes fairly regular, and the seventh and eighth and apical portions of the others are moderately impressed and distinct, marginal interspace with a few coarse punctures behind the subhumeral interruption; shield small but convex and distinct; markings rather light and diffuse, the standard spots rather indistinct, especially the inner series, which may be in part or entirely lacking.

Pygidium rufo-testaceous, darker at base, apical parts paler, the spots sometimes evident, but usually vaguely diffuse. Body beneath brown or fuscous, sides and apex of abdomen more or less evidently paler. Legs yellow with median darker femoral and tibial bands.

Length 2.8 to 3.25 mm.; width 1.5-1.75 mm.

Distribution.—*Georgia*: Tybee Island, July 2 to 6 (Wenzel), type ♂.

This species bears a certain resemblance to some examples of *characteristicus* and *femoratus*. It differs from the former in its less broadly diffuse punctuation and better defined elytral striae, and from both by the more approximate eyes and small front

claws of the male. Its close relationship to *confederatus* is alluded to under that species.

73. ***Pachybrachys calcaratus*** new species

Sordid yellow with diffuse fuscous markings which may be so extensive as to constitute the prevailing color; clytral striae evident at sides and rear, front without ocular lines; front tibiae of male with subapical rectangular tooth on the inner margin due to the abrupt narrowing of the tibia, and a long stout curved terminal spur; front claws of male not appreciably enlarged. Ave. length 2.9 mm. Michigan to Louisiana.

Head not wider than the thoracic apex, front coarsely moderately closely punctate, markings variable. Eyes separated in the male by one and one-half times the length of the basal antennal joint, or by a distance equal to or very slightly greater than the vertical width of their upper lobes; in the female by approximately two and one-half times the length of the basal joint of the antennae. Antennae moderate, attaining the hind coxae in the female, longer in the male, tenth joint about three times as long as wide, outer joints fuscous.

Prothorax distinctly arcuately narrowed from near the base, a very short slight sinuation at the hind angles; punctuation coarse, rather close, side margins narrowly smooth, at least in part; markings variable but usually broad, leaving two basal and a median apical spot and the front angles irregularly pale.

Elytra coarsely punctate, the two outer striae distinct and moderately impressed, the discal ones much confused or broken, sometimes with one or two subentire; shield not large but usually well defined and convex; marginal interspace with coarse punctures, usually more numerous in the female, but sometimes nearly wanting; markings variable, the standard spots sometimes small and isolated but more frequently broad and confluent, the general color fuscous with numerous small scattered yellow areas.

Pygidium blackish with two oblique yellow spots. Body beneath blackish, the last ventral and side margins of the abdomen sometimes marked with yellow. Legs brownish fuscous, base and apex of middle and hind thighs yellow; front thighs with large yellow spot or stripe on the anterior face.

Length 2.6 to 3.2 mm.; width 1.4 to 1.8 mm.

Distribution.—*Illinois*: Hinsdale, June 21 (Bebb), type ♂; Ill. (Stromberg in Blanchard Coll.); (Liebeck Coll.). *Michigan*: Detroit (Hubbard and Schwarz). *Iowa*: One ♂ without specific locality. *Kansas*: Salina (Knaus). *Louisiana*: Vernon Parish (Leng Coll.); Vowell's Mills (Leng).

The Louisiana specimens are less heavily marked than the Illinois and Iowa ones, but they agree with each other, and one of them is a male with the remarkable front tibial character precisely as in type. This species in general facies resembles pretty closely some examples of *atomarius* and other similar species, but

the sexual tibial character of the male at once identifies it. In this particular it is almost unique, *texanus* and *uncinatus* only possessing a similar structure. In these two, however, there is no subapical tooth and the eyes are much more approximate. *Calcaratus* is apparently rather rare or else quite local as it is represented in but few collections that I have seen.

74. ***Pachybrachys cylindricus*** ^SBowditch

Light yellow, prothorax and elytra strongly shining, the alutaceous sculpture either lacking or so fine as to be scarcely detectable; standard markings present, the spots as a rule quite sharply defined and rather small, the prothoracic M extending from base to apical two-fifths or one-third, rarely beyond. Eyes more distant in the male than the width of their upper lobes, front without ocular lines; elytral striae scarcely impressed and much confused; front claws of male strongly enlarged. Ave. length 3.75 mm. Utah to southeastern California.

Head as wide as the prothoracic apex, front mostly yellow, finely and sparsely punctate, supra-antennal spots nearly wanting, triangular frontal spots rather small and narrowly connected with the broad black vertex spot, the latter closely punctate. Eyes separated by twice the length of the basal antennal joint in the male, and by fully three times the length of this joint in the female, or in the latter sex by a distance as great as the entire length of the eye. Antennae very long and slender in the male, nearly or quite attaining the elytral apex, the tenth joint four to five times as long as wide; in the female not more than two-thirds as long as the body, the tenth joint about three times as long as wide.

Prothorax less transverse than usual, apex a little narrower than the base, sides moderately arcuate behind the middle, a little incurved basally, surface sparsely finely punctate except in the darker areas, the latter variable in development, sometimes nearly wanting, again black and sharply defined, never very broad, and rarely extending in front of the apical third; the central stripe distinctly forked in front and usually joining the lateral arms so as to enclose two basal pale spots.

Elytra rather sparsely and finely punctured, the striae much broken, two and three usually entire, seven more or less regular, eight well defined and somewhat impressed; shield small or moderate, marginal interspace impunctate or with one or two punctures near the middle; outer standard spots distinct, not large; posterior inner spot joining the outer to form a distinct transverse fascia; the middle inner spot forming an oblique projecting spur from this fascia; anterior inner spot often more or less vague or diffuse.

Pygidium black and yellow. Body beneath black, with the flanks of the prothorax, metasternum in part, and sides and apex of abdomen more or less pale. Legs almost entirely pale yellow.

Length 3.3 to 4.25 mm.; width 1.75 to 2.3 mm.

Distribution.—*Arizona*: Prescott (type); Ash Fork, June 18 (Barber & Schwarz); Williams, July 18 (Barber & Schwarz). *Utah*: American Fork Cañon, June 23 (Hubbard & Schwarz); Chad's Ranch (var? in Bowditch Coll.). *Nevada*: Esmeralda, June 27 (Nunemacher). *California*: Los Angeles Co., May (Am. Ent. Soc. Coll.).

75. ***Pachybrachus notatus*** Bowditch

Original description. "Large sized, stout, dull black and bright yellow, thorax with three prominent yellow spots on top, elytra fairly regularly striate punctate. Length $3\frac{1}{2}$ mm."

"Head yellow, flat, with black vertex, connected with center line, which runs into a crescent mark which ends at the antennae on either side, black marks thickly punctate, clypeal edge also black, sparingly whitish pubescent, especially in the angles of the eyes, which are distant; antennae dark, lighter toward the base, reaching the hind coxa in ♂; thorax constricted in front and narrowed behind, yellow, with very narrow beading on front margin black, the surface covered by a broad black M, which occupies nearly the whole rear margin and leaves a lateral and anterior border of yellow, the former being the widest; there is also a pear-shaped yellow spot placed obliquely and pointing to the scutellum on either side of the disk at the rear, dilated end to the front and an anterior median spot, which joins the yellow margin, also a small yellow dot on each side; surface with sparse punctures, closer toward the anterior corners, the yellow margins, except as aforesaid, are about free from punctures, lateral edge very slightly subangulate in ♂; elytra parallel, slightly compressed behind the shoulders, yellow, with suture and margin narrowly black; the inside standard spots suffused longitudinally into an irregular black mark joining a transverse band on the convexity formed by the suffusion of the four rear spots, the external middle spot is not suffused, the humeral spot is also distinct, the punctuation is a little coarser than the thorax, largely confused, but the intervals from the third outwards on the the rear half of the elytra are more or less distinctly indicated, though the costae are everywhere flat, the third and fourth and the marginal and next to it are the most marked intervals, there is also a prominent smooth yellow sutural shield and another patch occupying three or four intervals and forming a transverse spot on the side just before the convexity; marginal stria barely sinuate behind the lobe, which is wide and smooth, with a fine row of marginal punctures; under side black, with silvery pubescence, prosternum semisulcate; legs yellow, with spots on thighs, and tibiae and tarsi darker; hind thighs with a white spot on end, and front thighs with light spot on front."

"One ♂ Santa Rita Mts., Arizona. Collected by the late Professor Snow. In form, size and general appearance very similar to *inclusus* Jac. Type in Snow collections."

I have not seen the unique type of this species, and as the above description does not touch upon the characters most needful for

assigning the species a place in the classification here adopted, I addressed a letter of inquiry to Prof. S. J. Hunter of the University of Kansas, who very kindly examined the type and answered my questions so far as possible. Unfortunately the claws are lacking on both front tarsi of the type, which makes it impossible to place the species with any certainty. The surface is somewhat shining though with distinct alutaceous sculpture; the eyes are separated by twice the length of the basal antennal joint, tenth joint "3 to $3\frac{1}{2}$ " times as long as wide; ocular lines wanting. The marginal interspace of the elytra is said by Professor Hunter to be punctate but from a sketch of the elytra sent by him I should judge that it was not; a doubtful point. I have assumed that the front claws are enlarged, but as this is scarcely more than a guess, the species must be regarded as tentatively placed.

76. ***Pachybrachys caelatus*** LeConte

Dull pale yellow, markings varying from rather heavy and almost black, to entirely wanting on the elytra and with only faint pale brownish shades on the prothorax. Eyes very widely separated, front sparsely punctate except in the median impression, without ocular lines. Elytral striae for the most part fairly regular and entire; front claws of male very large. Average length 2.8 mm. Kansas and Texas to southern California.

Head subequal in width to the thoracic apex, front unevenly punctate, sparsely so in the pale areas. Eyes separated in the male by fully twice the length of the basal joint of the antennae and in the female by more than three times the length of this joint, or by nearly the entire length of the eye. Markings variable in extent, the pale color commonly predominating. Antennae moderate, scarcely more than two-thirds the length of the body in the male, outer joints blackish, the tenth about three times as long as wide.

Prothorax moderately transverse, evidently but not strongly narrowed in front, widest near the base, sides feebly arcuate, punctuation somewhat sparse, closer as usual in the darker areas, side margins smooth; markings variable, the M sometimes very broad, leaving only three elongate pale discal spots, but usually much narrower and more or less disintegrated, the pale areas fully as extensive as the dark.

Elytra with confused punctuation in a rather small scutellar area, otherwise with more or less regular lightly impressed striae, the eighth usually nearly straight throughout, fifth and sixth sometimes a little confused and the inner ones also somewhat variable in degree of regularity; marginal interspace with

a few punctures representing the usual break in the eighth stria and occasionally with one or two further back; shield elongate, usually well developed; standard spots generally small or subobsolete, usually more or less linear in form, the outer series not encroaching upon the marginal interspace.

Pygidium yellow with black markings, or black marked with yellow. Body beneath black, the last ventral often more or less pale. Legs pale with faint median femoral and tibial clouds which become more pronounced in the darker specimens.

Length 2.5 to 3.2 mm.; width 1.35 to 1.7 mm.

Distribution.—*California*: Described from San Diego and Fort Yuma. *Arizona*: Bright Angel, July 5; Winslow (Wickham); Nogales, Aug. 30 (Numenmacher); Santa Rita Mountains, 5,000 to 8,000 ft., July (Snow). "Ari." Am. Ent. Soc. Coll.). *Utah*: A ♀ specimen in my own collection without specific locality. *New Mexico*: Los Vegas Hot Springs, Aug. 3 to 12 (Barber and Schwarz); Socorro, Aug. (Snow); Clouderoft, June 16 (Viereck); Magdalena Mountains, Aug. (Snow). *Colorado*: (Am. Ent. Soc. Coll.). *Kansas*: Greeley Co., 3,550 ft. (F. X. Williams); "Ks" (Beyer Coll.). *Texas*: (Beltrage in Nat. Mus. Coll.); Camp San Saba, May 27 (Knaus); Green Valley, Chisos Mountains, July 14 (Wenzel).

The most important characters of this species are the widely distant eyes combined with the very large front claws of the male. The integuments are quite distinctly though finely alutaceous in some specimens, while in others barely visibly so and quite strongly shining.

77. *Pachybrachys brevicollis* LeConte

Dull pale yellow, with ferruginous to fuscous punctures and standard spots, the latter inclined to be diffuse and ill-defined though not very broad; eyes more distant in the male than the vertical width of their upper lobes; front without ocular lines; front claws of male strongly enlarged.

Average length 3 mm. Texas to Montana.

Head not at all wider than the thoracic apex, frontal markings moderate, punctuation uneven. Eyes separated by one and one-half to one and three-fourths times the length of the basal antennal joint in the male, and by twice the length of this joint or slightly more in the female. Antennae moderate, yellow, with the outer joints and a spot on the basal joint blackish, tenth joint (♂) a little less than three times as long as wide.

Prothorax strongly transverse, broadly arcuately narrowing toward the front; punctuation dense in the dark areas, the M fairly distinct but somewhat broken, variable in extent, not attaining the front margin; side margins smooth.

Elytra confusedly closely punctate in a scutellar triangle of variable size, striae distinct laterally and posteriorly, four to six more or less broken except toward the rear, submarginal stria with a slight post-humeral sinuation, beneath which there are a few punctures, more numerous in the female, the marginal

interspace otherwise impunctate or virtually so; shield small, generally indistinct.

Pygidium blackish and yellow, typically marked. Body beneath blackish, last segment of abdomen apically pale. Legs yellow, with small femoral and tibial spots or shades brownish.

Length 2.75 to 3.4 mm.; width 1.5 to 1.8 mm.

Distribution.—*Texas*: (Belfrage) type; in addition to the type I have seen some seven or eight examples labeled simply "Tex." in the LeConte, Horn, Nat. Museum and Leng Collections, most if not all of which were probably from the same source. *Colorado*: (Leng Coll.). *Montana*: (Leng Coll.).

The general appearance of this species is altogether like that of numerous other medium sized dull yellow and brownish mottled forms, but LeConte removed it from the indefinite species and included it in his table,⁴ from a fancied difference in the prosteronum. In the short description the prothorax is said to be nearly three times as wide as long. This is the most extreme instance known to me of this previously alluded to tendency of LeConte to overestimate the greater dimension in terms of the smaller. By careful measurement of the type I found the prothorax to be 1.45 mm. wide and .85 mm. long, the width being nearly 1.7 times the length. In the type the dark markings are ill-defined, the scutellar region largely suffused with brownish, the middle marginal spot is only feebly indicated; the thoracic markings are dark brown and rather broad in the labeled example, less dark in the second specimen, in which also the elytral marks are smaller. The front claws of the male are strongly enlarged, though not quite to such an extreme as in *caelatus*.

78. ***Pachybrachys nubigenus*** new species

Yellow, prothoracic markings broad, elytra with sutural region more or less broadly suffused with pale reddish brown to almost black, the color darker in the male; eyes in male separated by a distance barely as great to evidently greater than the vertical width of their upper lobes; front with ocular lines; elytral punctation largely confused, marginal interspace numerously punctate; front claws of male distinctly enlarged. Ave. length 3.3 mm. Southern California.

Head coarsely subevenly and moderately closely punctate, predominantly yellow; the antennal spots subobsolete, median spot rather small, rufo-testaceous or brownish, vertex spot usually darker. Eyes separated in the male by slightly more than the length of the first two antennal joints, in the female by

⁴ Trans. Am. Ent. Soc. viii, p. 208, July, 1880.

rather more than twice the length of the basal joint. Antennae attaining the hind coxae in the female, a little longer in the male, tenth joint about three times as long as wide.

Prothorax widest at about the basal fourth, a little contracted basally with a slight sinuation before the angles, moderately convergent and broadly arcuate or nearly straight in front; punctuation rather coarse and close, somewhat uneven, side margin smoother; M broad, diffuse, pale brown.

Elytra densely, coarsely and in great part confusedly punctured, the second or third stria or both usually fairly regular and entire, as are the seventh and eighth, the apical portions of some of the others more or less distinct; striae feebly impressed; shield small and indistinct or wanting; marginal interspace broad and numerously punctate in at least the basal half or two-thirds; standard spots usually not defined. In the type the shoulder knob is dark and the apical outer spot is distinct, the inner spots suffused into a broad blackish sutural cloud which is somewhat disintegrated or encroached upon by yellow spots at the middle externally. In other examples the outer spots are entirely wanting and the median cloud is paler brown.

Pygidium yellow with the usual bisinuate blackish border at base. Body beneath brown to blackish with the tip of the abdomen pale. Legs pale with light brown spots or rings on the femora and tibiae, sometimes indistinct.

Length 3.1 to 3.5 mm.; width 1.7 to 1.85 mm.

Distribution.—*California*: Pasadena, May, type ♂; Laguna Beach (Baker); Los Angeles Co. (Coquillett in Nat. Mus. Coll.); (Van Dyke); San Bernardino Co. (Van Dyke).

After a good deal of comparison and deliberation I still feel considerable uncertainty as to the standing of this species. The problem, however, may be considered a part of that involved in the relationship of *arizonensis* and *punctatus* and their varieties or allied forms, for *nubigenus* is surely closely related to these though removed from them for convenience in tabulation. Superficially *nubigenus* is at once distinguishable from either of these species by the dorsal cloud on the elytra. In *punctatus* the elytral spots are occasionally well developed, more especially in the var. *shasta*, but in my experience the spots are always more or less clearly defined, never broadly suffused into a single cloud as in *nubigenus*; and moreover it is in the female of *punctatus* that the maculation is most developed, the male only rarely showing traces of spots, while in *nubigenus* the dorsal cloud is broadest or at least darkest in the male. In *arizonensis* the elytra appear to be invariably completely devoid of maculation, the discal punctuation is rather less dense, the elytral series of punctures a little better defined, and the front claws of the male a trifle smaller relatively than in *nubigenus*. In both *punctatus* and *arizonensis*

the punctures along the side margin of the pronotum are smaller and paler than in *nubigenus*. The width of the front between the eyes shows quite a little variation and the ocular lines are in some examples so close to the eyes as to appear to be wanting. Just such variations have been observed in *punctatus*. *Nubigenus* is somewhat similar in the dorsal elytral cloud to the following species—*punicus*—which see for a statement of differences.

79. ***Pachybrachys punicus*** new species

Yellow, prothoracic markings rust colored and more or less disintegrated and diffuse, elytra with fuscous dorsal clouds made up of the more or less connected and suffused inner series of spots; the outer spots feeble or wanting, except the posterior one, which is often connected with the inner cloud; eyes (σ^7) much more distant than the width of their upper lobe; front with ocular lines, distant from the eyes; outer four or five elytral striae entire or nearly so and fairly regular; front claws of male a little enlarged.

Ave. length 2.75 mm. Southern California.

Head rather sparsely punctate, front almost entirely yellow, the median impressed line sometimes faintly rust colored, vertex spot present; ocular lines distinct and at about two-fifths the distance from the eyes to the median line of the front. Eyes separated fully twice the length of the rather large basal joint of the antennae in the male, and by three times the length of the basal joint in the female. Antennae pale basally, outer joints blackish, fully three-fourths the length of the body in the male, not much more than half the length of the body in the female, tenth joint about three times as long as wide.

Prothorax widest at basal fourth, evidently but not strongly narrowed in front, sides feebly arcuate or nearly straight anteriorly, rounded in a little basally, with a slight sinuation before the angles; punctuation somewhat uneven, fairly close in the diffuse rust colored markings, elsewhere sparse, the side margins smooth.

Elytra densely irregularly punctate in a moderate sized baso-sutural triangle, elsewhere subregularly striate, striae finely impressed, eighth nearly straight without subbasal dislocation; marginal interspace with a series of coarse punctures which is usually more or less interrupted medially; shield large and conspicuous, yellow, contrasting with the dark markings.

Pygidium, body beneath and legs as in the preceding species.

Length 2.45 to 3.05 mm.; width 1.25 to 1.7 mm.

Distribution.—*California*: Pomona, foothills, June 11, σ^7 type; Claremont (Baker); Los Angeles Co. (Coquillett in Nat. Mus. Coll.). *Lower California*: San Felipe (Beyer).

This species looks a good deal like a small *nubigenus* because of the similar dorsal elytral cloud; here, however, the suffusion is generally less complete. In addition to the smaller size, this species differs distinctly from *nubigenus* in its less dense punctation, more widely separated eyes, more conspicuous ocular lines, which are more distant from the eyes, much more regularly striate elytra, with the marginal interspace less numerously punctate, front claws of male a little less noticeably enlarged. *Punicus* is more nearly related to and very like those extreme forms of *diversus* with the discal elytral cloud, but the latter have the eyes distinctly less remote.

80. ***Pachybrachys melanostictus*** Suffrian

Black and dull yellow, mottled, sometimes the pale, sometimes the dark areas, in excess, prothoracic M usually heavy; eyes widely separated, front with distinct ocular lines; elytral striae well defined at sides and rear, outer interspace with few punctures; front claws of male a little enlarged. Ave. length 2.9 mm. Pacific Coast States and those immediately adjoining.

Head unevenly rather coarsely punctured, markings variable in development, the front often predominantly yellow in the male, but more heavily marked with black in the female, the parts most persistently yellow being a spot on either side of the middle opposite the upper margin of the eyes within the ocular lines, and a median spot between the antennae. Eyes separated by fully twice the length of the basal antennal joint in the male, and by about three times the length of the joint in the female. Antennae dull yellow basally, outer joints blackish, fully three-fourths as long as the body in the male, basal joint rather large, tenth about three times as long as wide; in the female about two-thirds as long as the body, basal joint smaller, tenth about two and one-half times as long as wide.

Prothorax moderately transverse in the male, more strongly so in the female, widest at basal third (♂), or about basal fourth (♀), moderately narrowed anteriorly, a little constricted at base, with or without slight sinuation before the angles; punctation rather coarse and fairly close, a little uneven, sparse along the side margins; M broad as a rule, often involving the entire surface except a longitudinal spot each side of the middle extending forward from the base a variable distance, a narrow median apical line, and the side margins widening at the anterior angles.

Elytra diffusely punctate in a baso-sutural triangle, exterior and posterior to which the punctures are arranged serially, the striae finely impressed at sides and rear, the fifth and sixth more or less confused before the middle as a rule; marginal interval with a few punctures in basal half; shield variable, usually rather small and inconspicuous, often obsolete. Standard spots may all be present and are then usually more or less suffusedly connected. In the paler

examples the middle exterior spot is often absent, and the corresponding inner spot nearly so; the latter is almost invariably connected with the one behind it, which very often joins the outer posterior spot.

Pygidium sometimes entirely black but usually with the typical yellow apical spots. Body beneath black, the apex and sometimes side margins of venter pale. Legs yellow with dark femoral and tibial spots of variable extent.

Length 2.4 to 3.3 mm.; *width* 1.3 to 1.7 mm.

Distribution.—*California*: "Northern California," type; San Diego, May 1; San Bernardino Mountains, July 12; Pasadena, June 12; Pomona, April 4 to 30; "So. Cal. Smith's Springs, 3,300 ft., Apr. 19" (Snow Coll.); Fredalba, July 29 (Pilate); Kaweah and vicinity, April and May (Hopping in various Colls.); Bishop, June, and Mill Valley, June (Fenyès); Lake Tahoe, July 17 to 21; Sonoma Co. (Van Dyke); San Jose, "on willows" (Mrs. A. S. Bush in Nat. Mus. Coll.); Los Angeles Co., San Joaquin Co., and Tehama Co. (Coquillett in Nat. Mus. Coll.); Placer Co. and Siskiyou Co. (Koebele in Nat. Mus. Coll.); Yreka (Leng Coll.); Marin Co. and Lake Co. (Leng Coll.); Blair's Ranch, Humboldt Co. (H. S. Barber); Sisson (Hubbard & Schwarz); Shasta Springs, July (Fenyès); Cole, July (Fenyès); Dunsmuir (Wickham). *Oregon*: Portland (Wickham); Huntington (Leng Coll.); "Or" (Koebele). *Washington*: Easton (Koebele—Nat. Mus. Coll.); Olympia (Liebeck Coll.); Snokomish (Nat. Mus.). *British Columbia*: Emerald Lake, June (Fenyès); Vernon (Wickham Coll.); Kaslo, June to Aug. (Caudell and Currie—Nat. Mus. Coll.). *Idaho*: Pocatello (Wickham). *Nevada*: Elko; Reno (Wickham). *Utah*: City Cañon, June 28; Stockton, June 11 (Knaus); Provo (Wickham); American Fork Cañon, June; Wahsatch, June 27 (Hubbard & Schwarz). *Arizona*: Oak Creek Cañon, 6,000 ft., Aug. (Snow.). *Colorado*: Garland, June 29, and Alamosa, July 3 (Hubbard & Schwarz).

A widely dispersed and very common species in the Pacific Region, and variable in a greater or less degree in almost all its characters. For that reason it can not be described very satisfactorily, nor can hard and fast lines be drawn between it and its nearer allies *signatifrons*, *peccans* and *signatus*, all of which may be reached with little or no break along one or another line of variation. I do not now venture to assert that these supposed species constitute a single one; it may be so, but in any case it will be well for the present to use these names for certain typical forms, whether they be specific or varietal. The relations of these other forms to *melanostictus* is made sufficiently clear by the tabular characters combined with the short comparative descriptions which follow.

81. *Pachybrachys peccans* Suffrian

Diagnostic characters nearly as in *melanostictus*. As indicated in the table, the eyes are slightly less distant in this species, being separated in the male from one and three-fourths to twice the length of the basal joint of the antennae, while the front claws of the male are as a rule more distinctly enlarged.

The maculation is here similarly variable but the prevailing tendency is toward a reduction of the black markings, until in extreme forms all traces of the elytral spots have disappeared leaving only the rows of blackish brown punctures. The thoracic shades in these pale examples may remain well marked or may become much reduced in extent and in depth of tint, but seem never to entirely disappear. At the other extreme we find specimens in which the dark areas are more or less evidently in excess, but these are comparatively infrequent and very rarely does the degree of suffusion approach that seen in the darkest forms of *melanostictus*. I am unable to discover any differences in sculpture which may be depended on to separate these two species. As is generally true in mottled forms the darker specimens are the more closely punctate ones, so in general it may be said that the punctuation in *peccans* is sparser than in *melanostictus*, the difference being most noticeable on the front, and in the baso-sutural triangle of the elytra; but precisely the same differences exist between pale and dark individuals of either species. The elytral striae are typically a little more impressed in *peccans*. While *peccans* varies toward *melanostictus* in its darker individuals, it approaches so closely to *diversus* and *abdominalis* in some of its paler forms as to make distinction purely discretionary. *Diversus* in its typical form is a somewhat smaller species, of a rather brighter yellow color, without markings or with only faint rust-colored shades, and east of the one hundredth meridian or thereabouts there appears to be no difficulty in distinguishing the two species; specimens occur, however, on the plains from Dakota to Texas which may be assigned to either with equal propriety.

Only those specimens of *peccans* with immaculate elytra may be confused with *abdominalis*. The latter is as a rule a larger and more robust species with relatively somewhat finer punctuation and more feebly impressed elytral striae; for further comparison see remarks under *abdominalis*.

This species stands as *atomarius* Melsh. in the LeConte collection, which interpretation has been followed by Bowditch—at least there are specimens in the material before me so labeled in Bowditch's handwriting. That the present species is the true *peccans* of Suffrian is, however, established with certainty by examination of a type sent me by Professor Taschenberg, which agrees in every way with Suffrian's description.

Peccans is a common and widely diffused species, especially in the northern part of our territory from the Atlantic to the Rocky Mountains extending south in the western part of its range to Texas and New Mexico. The following localities are known to me.

Distribution.—*Delaware*: type, in Suffrian Coll. *New Brunswick*: July 8 (McIntosh). *Maine*: East Machias, July (Foyes). *Massachusetts*: Middlesex Co. (Blanchard); Chatham, July 11 (Frost), also in Snow Coll.; Ashland, June 4, sweeping grass, and Framingham, May 23, on *Rumex* flowers (Frost);

Concord (Wenzel Coll.). *New York*: Buffalo (Leng and Nat. Mus. Colls.); "N. Y." and vicinity N. Y. City (Van Dyke Coll.). *New Jersey*: Anglesea (Wenzel); July 3 (Liebeck); "Atl H," June 18 (Leng). *Florida*: Duval Co. (Leng Coll.). *Ontario*: Sudbury (Evans); Toronto (Crew?); Scotia Junction (Wenzel); "Can" (Van Dyke Coll.). *Michigan*: Isle Royal, July 11; Bache-wanung Bay, Aug.; Detroit; Marquette, July 3 (all Hubbard & Schwarz); "Mich" (Liebeck Coll.) (Dury Coll.). *Wisconsin*: Bayfield (Wickham); "Wis" (Linell in N. Mus. Coll.). *Minnesota*: Duluth (Casey). *Indiana*: (Liebeck Coll.) (Van Dyke Coll.). *Iowa*: Iowa City, May 23 and Des Moines, July 4 (Wickham); Council Bluffs, July 23 (Shoemaker—in Wickham Coll.). *Mis-souri*: (Nat. Mus. Coll.). *Kansas*: Modora, May (Knaus); Mt. Hope, June. *Nebraska*: McCook (Wickham); West Point (Nat. Mus.); "Neb." (Nat. Mus.) (Snow Coll.). *South Dakota*: Volga (Truman). *North Dakota*: Fargo (H. Osborn in Nat. Mus. Coll.); Bismarek; Devil's Lake, June 6 to 7, and Williston, June 9 to 10 (Wickham). *Maine*: (Am. Ent. Soc. Coll.); Aweme, July 27 (Leng Coll.); Winnipeg (Wickham Coll.). *Montana*: Helena, July 7 (Mann); Kalispell, June (Wickham); Assiniboine, Aug. 21 (Hubbard & Schwarz); "Mont" (Nat. Mus.). *Wyoming*: Laramie, June 2 (Knaus); Big Horn, July 9 (Soltan in Nat. Mus. Coll.); "Wyo." (Snow Coll.). *Colorado*: Greeley (Wickham); Denver, July 7 (Nat. Mus.), May 9 (Soltan in Nat. Mus. Coll.). Colorado Springs, Aug. 27, (Soltan), June (Wickham); Pueblo, May 20 (Soltan); Ft. Collins (Liebeck); Pikes Peak, 9-10,000 ft. (Horn Coll.); Buena Vista (Wickham—in Horn Coll.). *Texas*: El Paso (Fenyès). *New Mexico*: Santa Fé, Aug. (Fenyès); Pecos, July 1 (Cockerell); Jemez Springs (Nat. Mus.); Albuquerque, June 29 (Wickham); Las Vegas Hot Springs, Aug. 2 (Barber & Schwarz). *Utah*: Utah Lake, June 20; Wahsatch Mountains, June 29; Ogden, July 3 (all Hubbard & Schwarz). *Oregon*: Humington (Hubbard & Schwarz).

82. *Pachybrachys signatifrons* Mannerheim

Diagnostic characters same as in *melanostictus*, very dark examples of which are not with certainty separable and probably are not distinct from the present species. According to the original description of Mannerheim, *signatifrons* is black, with frontal spots, side margins of thorax, basal and humeral margins of elytra, and the femora at base flavo-ferruginous. From this typical coloration, variation occurs in both directions; the small yellow marks may become still further reduced or in part entirely lost, though I have never seen an entirely black specimen. The spots on the head, though variable in extent are quite persistent, and traces at least of yellow are almost invariably present on the raised basal edge of the elytra. The prothorax is usually punctured to the extreme side margin, and when most closely so the yellow margin entirely disappears. From this condition there is every possible gradation to the smooth entirely pale side margin in typical *melanostictus*. The front claws of the male are only feebly enlarged in *signatifrons*, a little more obviously so in typical *melanostictus*, but the difference is very slight and also gradational, some specimens or races of *melanostictus* differing scarcely at all in this respect from *signatifrons*. There appear to be no other marks of distinction.

Distribution.—*California*: Humboldt Co., May and June (Nunenmacher); Blair's Ranch (H. S. Barber); Dunsmuir (Wickham); Sylvania and Los Gatos (Hubbard & Schwarz); Santa Cruz Mountains (Nat. Mus.); Santa Clara Co. (Koebele—Nat. Mus. Coll.); Sonoma Co., Lake Co., Vine Hill, Contra Costa Co. (Blaisdell); San Bernardino Mountains, 6,400 ft., Aug. (G. R. Pilate); So. Cal. (Hopping). Mannerheim's type is recorded from "California" simply.

83. **Pachybrachys signatus** Bowditch

Yellow, with black or brown markings somewhat variable, typically with a broad median thoracic stripe, narrowly divided in front, and with the side arms of the M more faintly indicated; elytra with a discal U shaped mark with the arms resting on the middle of the base and crossing the suture just before the shield; posterior standard spots fused into a transverse fascia; eyes separated by fully twice the length of the basal antennal joint in the male, and by three times the length of this joint in the female, ocular lines distinct; front claws of male a little enlarged. Ave. length 2.8 mm. Arizona to western Texas.

The essential characters are, as will be seen, virtually those of *melanostictus*; the maculation, however, is more specialized and the posterior elytral fascia together with the median thoracic stripe constitute its most persistent and typical features. The middle and anterior standard spots of the elytra are frequently faint or wanting, the frontal spots are small and pale, that on the vertex usually well marked. The eyes are a little more prominent than in *melanostictus*, the front is rather closely punctate, the elytral striae are as a rule a bit more regular, the fifth and sixth less liable to be confused; legs yellow with small and often faint femoral spots; the antennae more completely yellow than in *melanostictus*.

Distribution.—*Arizona*: Prescott, type; Tueson, May 6 (Hubbard & Schwarz); Phoenix (Am. Ent. Soc. Coll.); "Ari" (Nat. Mus. Coll.). *Utah*: Mill Creek, June 16 and Am. Fork, June 24 (Hubbard & Schwarz). *New Mexico*: (Snow Coll.). *Texas*: Davis Mountains, July 8 (Wenzel).

Signatus is closely related to *melanostictus* and most of the distinguishing characters mentioned above are really of little weight. It is exactly intermediate between *melanostictus* and *livens*, and appears to be quite as close to the latter, with which it nearly agrees in the slightly prominent eyes and general form and sculpture. In *livens* the middle thoracic scribe is rarely divided in front by a pale line, the lateral thoracic shades are almost or quite wanting, the elytra are immaculate and the front claws of the male are only just perceptibly larger than the others. Specimens of *melanostictus* with the rear elytral spots suffused

into a transverse fascia and with the other elytral spots faint or obsolete, resemble *signatus* quite strongly, and, in the material before me, a Stockton, Utah, example bears the name *signatus* in Bowditch's handwriting. Most of the examples of this form are from the arid regions of the Great Basin, and there is little doubt that the Provo, Utah, specimens provisionally referred to *signatus* by Bowditch belong here. These are separable from the true *signatus* by their paler whitish yellow color, and in possessing the somewhat less prominent eyes and a little larger anterior male claws, as in other *melanostictus*. Bowditch describes *signatus* as shining; some specimens are somewhat so, but all show a very distinct alutaceous sculpture throughout.

84. ***Pachybrachys postfasciatus*** new species

Dull yellow, scarcely at all shining, thickly and for the most part confusedly brown punctate, the elytra with some more or less fragmentary striae, not or feebly impressed towards the rear and sides; standard spots very diffuse, the posterior ones coalescing to form a more or less distinct fascia on the elytral declivity; eyes distant, ocular lines present but sometimes very faint or subobsolete; front claws of male evidently enlarged. Ave. length 2.7 mm. Texas, Kansas, Arizona.

Head closely punctate above the antennal insertion, sparsely so in front, markings very vague and diffuse; eyes separated in the male by two to two and one-fourth times the length of the basal antennal joint, and in the female by about three times the length of the basal joint. Antennae moderate, dull yellow, basal joint in part, and outer joints more or less brownish; tenth about two and one-fourth times as long as wide in the male; in the female the antennae do not pass the middle of the body, the tenth joint relatively slightly shorter.

Prothorax moderately transverse, not much narrowed in front, especially in the male, sides broadly arcuate, slightly rounded in at the base; punctuation rather close but somewhat uneven, sparse along the side margins, markings very diffuse.

Elytra confusedly and thickly punctate in a broad baso-sutural triangle, exterior to this the punctures are less close and show a tendency to form short and imperfect or irregular striae; submarginal stria usually much confused in the female, but better defined in the male; marginal interspace punctured; shield small, often scarcely detectable.

Pygidium brown with small yellow spots. Body beneath brown, last ventral segment with or without a lateral pale spot. Femora yellow with broad brown rings, tibiae brown.

Length 2.5 to 2.9 mm.; width 1.35 to 1.7 mm.

Distribution.—*Texas*: Two males and five females are before me from the Leng, National Museum and Am. Ent. Soc. Collections. *Kansas*: Douglas Co. (Snow). *Arizona*: Ash Fork (Barber & Schwarz).

The Texas examples, including the type (♀), are without indication of specific locality. The Kansas specimens are more elongate than in the typical form, the eyes in the male a little more distant and the clytral fascia obsolete or faint. In the single Arizona male the form and obsolete clytral fascia are almost exactly as in the Kansas one, but the eyes are not more distant than in the type form; these variations are probably not specific, at least they need to be supported by more specimens before they can be so considered.

85. ***Pachybrachys vacillatus*** new species

Dull yellow, maculate with black, punctuation rather dense and in great part confused on the elytra; front without distinct ocular lines, these detectable but very close to the eyes; front claws of male distinctly enlarged. Ave. length 3.2 mm. California to Colorado.

Head not wider than the thoracic apex, spots small, surface, except in the spots, sparsely punctate; eyes separated in the male by a distance which is typically equal to the width of their upper lobes or about one and one-half times the length of the basal antennal joint, in the female by fully twice the length of the basal joint; antennae slender, blackish in outer half, three-fourths the length of the body in the male, tenth joint three times as long as wide.

Prothorax moderate in size, widest at about the basal third, distinctly narrowed in front, sides strongly rounded at point of maximum width, and broadly arcuate, nearly straight or feebly sinuate (in type) anteriorly, rounded in at base; punctuation uneven, moderately close in the M, which varies from moderate to broad, elsewhere sparse, lateral margins more or less smooth.

Elytra distinctly wider and rather more than twice as long as the prothorax, punctuation broadly diffused on the disk, striae feebly or scarcely impressed and as a rule more or less completely confused except the seventh and eighth and short apical remnants of some of the others, the third and fourth sometimes more or less defined; marginal interspace punctate at least in basal half in male, and throughout its length in the female, in which sex the two outer series of punctures are less distinct than in the male; shield wanting or at most feebly indicated. Maculation variable; the standard spots may be all present and distinct or they may be broadly diffused and confluent; quite as often the anterior one of the inner series is lacking and the middle one is small and joined to the posterior one; the middle outer spot is sometimes obsolete.

Pygidium black with the usual pale spots confluent at apex. Body beneath

black, last ventral segment more or less pale. Legs pale with the usual dark spots or rings on the thighs and dark shades on the tibiae.

Length 2.85 to 3.6 mm.; width 1.65 to 1.9 mm.

Distribution.—*California*: Giant Forest, July 7, type ♂, collected and given me by F. S. Daggett; South Fork of Kings River, Fresno Co. 5,000 ft., July 4 (Van Dyke); Lake Tahoe, July 11 (Hubbard & Schwarz); Eldorado Co. (Van Dyke.). *Utah*: (Am. Ent. Soc. Coll.). *Colorado*: Buena Vista (Wickham); Garland, June 25 (Hubbard & Schwarz).

This species seems to be more than usually variable; scarcely any detail is constant, and an accurate description of any individual will almost surely fail in some respect when applied to another. This is especially notable in the series from Lake Tahoe, yet there can be scarcely a doubt that they are specifically identical. The width of the front between the eyes is exceptionally inconstant, varying from about one and one-third to fully one and three-fourths times the length of the basal antennal joint, this latter variable in size also. The punctuation of the elytra is as a rule quite diffuse or irregular but in one or two specimens the serial arrangement of punctures is much more evident. On the whole the species is strikingly suggestive of *melanostictus*, but this latter has distinct ocular lines, small front claws in the male, and as a rule the eyes are more distant and the elytral punctuation less diffuse.

86. ***Pachybrachys badius*** new species

Head and prothorax reddish brown, the elytra darker; prothorax with side margin, narrow median anterior line and two basal spots yellow, these discal marks sometimes indistinct; elytra with more or less of the raised basal margin, some small anterior spots, the shield and a larger post median lateral spot bright yellow. Eyes (♂) a little more distant than the vertical width of their upper lobes; front without ocular lines; front claws of male distinctly enlarged. Ave. length 3.2 mm. Southern California.

Head not wider than the thoracic apex, front rather densely and coarsely nearly evenly punctate, median line somewhat strongly impressed toward the vertex, markings broadly suffused. Eyes separated in the male by about one and three-fourths, and in the female by about two and three-fourths times the length of the basal antennal joint. Antennae very thin, about four-fifths as long as the body in the male, the tenth joint nearly four times as long as wide; in the female scarcely two-thirds the length of the body, the tenth joint barely three times as long as wide.

Prothorax widest and with sides rather strongly rounded at basal fourth in the male, less rounded in the female, moderately narrowed in front, punctuation coarse, dense, sparser on the median line anteriorly, yellow side margins nearly smooth; the markings diffused nearly uniformly over the entire disk leaving only the side margins and the frequently indistinct anterior median line and basal spots yellow.

Elytra quite densely punctate, confusedly so in baso-sutural region, striae one and two not very distinct, three and four distinct and with the interval between them a little prominent throughout; five and six completely confused except posteriorly, seven and eight more impressed, the latter, at least, entire; shield prominent, bright yellow; marginal interspace more or less punctate in basal half or two-thirds; standard spots largely suffused, the two posterior marginal ones, however, separated by a conspicuous yellow spot.

Pygidium brown with oblique apical yellow spots.

Body beneath brownish fuscous, ventral apex sometimes paler.

Legs reddish yellow, tips of thighs paler.

Length 3 to 3.4 mm.; width 1.6 to 1.95 mm.

Distribution.—*California*: Los Angeles Co., ♀ type (Van Dyke; Pasadena, May 29; Mountains near Claremont (Baker); Mt. Pinos, Ventura Co., June 12 (Grinnell); Los Angeles Co., Coquillett in Nat. Mus. Coll.; "Cal" (Am. Ent. Soc. Coll.).

87. ***Pachybrachys quadratus*** new species

Whitish yellow mottled with black; prothorax rather small, scarcely narrower at apex than base, sides broadly arcuate, widest behind the middle, but not or very little wider than the head, which is obviously wider than the thorax at apex; front without ocular lines; front claws of male distinctly enlarged. Ave. length 2.75 mm. Southern California.

Head heavily maculate with black or brownish black, the pale areas sparsely punctate; eyes separated by about one and two-thirds times the length of the basal antennal joint in the male and by nearly three times the length of the basal joint in the female. Antennae fully reaching the hind coxae in the male, about half as long as the body in the female, outer joints more or less dusky or blackish.

Prothorax moderately transverse, blackish markings variable but generally broad, densely punctate, the light areas sparsely punctate, side margins smooth or nearly so.

Elytral striae moderately impressed, distinct laterally and posteriorly, more or less broken medially in front of the middle, the punctures much confused in the scutellar region; shield small; marginal interspace with a very few punctures anteriorly in the male, the punctures more numerous and extending through the greater part of the length in the female; outer standard spots distinct, the inner ones smaller and more diffuse.

Pygidium bicolored, the dark area predominating.

Legs pale with blackish spots at middle of femora and tibiae.

Length 2.25 to 3.2 mm.; width 1.2 to 1.7.

Distribution.—*California*: The male type was collected by Mr. Geo. H. Field at Alpine (foothills back of San Diego) in July; the female type is from San Diego, May. Other examples before me from San Dimas, Jan. 6; Poway (Blaisdell) and Catalina Island, July 11, differ in having the yellow of a brighter tint but are almost certainly identical.

88. ***Pachybrachys mobilis*** new species

Pale yellow with standard spots variably developed, brown to fuscous; eyes more distant in the male than the vertical width of their upper lobes; front without ocular lines; punctuation rather dense, the elytral striae more or less distinct behind and at sides, marginal interspace punctate; front claws of male evidently though not strongly enlarged. Ave. length 3.3 mm. Southern California to Colorado and western Texas.

Head moderately closely punctate, less closely in the paler portions, the vertex spot large, frontal spot moderate, not very sharply defined. Eyes separated by nearly twice (σ^7) or nearly three times (♀) the length of the basal antennal joint. Antennae pale at base, fuscous apically, three-fourths (σ^7) or two-thirds (♀) the length of the body, the tenth joint in the male barely three times as long as wide.

Prothorax widest at basal third or fourth, sides broadly arcuate, nearly straight and slightly convergent anteriorly, moderately closely somewhat irregularly punctate, sides smoother; M diffuse and not well defined, reddish brown and rather lightly marked, the color becoming somewhat more intense posteriorly, forming three darker ill-defined spots along the basal margin.

Elytra irregularly closely punctured in a rather large baso-sutural triangle, the striae elsewhere more or less distinct, the fifth and sixth completely confused before the middle, punctures generally denser and the striae less regular in the female; shield distinct; marginal interspace more or less punctate; outer standard spots usually distinct but as a rule rather small and a little diffuse; anterior inner spot diffuse and indistinct, middle one small and ill-defined, posterior spot better defined, often coalescent with the corresponding outer one.

Pygidium typically marked. Body beneath blackish, last ventral more or less pale. Legs pale, femora and tibiae with dark rings.

Length 2.75 to 3.8 mm.; width 1.4 to 2 mm.

Distribution.—*California*: San Bernardino Mountains, Aug. 10 (σ^7 type); Siskiyou Co. (Koebele in Nat. Mus. Coll.). *Arizona*: Williams, July 3 to 5; Walnut, July 22 (Wickham); Hot Springs, June 24 to 26, and Oracle, July 5 to 6 (Barber and Schwarz); Nogales, Aug. 12 to Sept. 13 (Nunemacher); Santa Rita Mountains, May 26 to June 2 (Hubbard & Schwarz). *Colorado*: Colorado Springs, Aug. 27 (Soltau Nat. Mus. Coll.). *Texas*: Chisos Mountains, July 16 (H. A. Wenzel), one female seems to be identical with the Nogales form.

The somewhat numerous specimens here included exhibit a

puzzling amount of variation, but offer no constant salient characters by which I can separate them specifically, although it is not unlikely that a number of distinct though very closely allied species are involved. In the type the eyes are a little more distant than the vertical width of their upper lobes, while in a male from Oracle, Arizona, the distance apart is obviously somewhat less than the width of the upper lobes, but this distance does not hold constant in any group of specimens from one locality, the variation being sufficient to baffle any attempt at separation on this basis. The Nogales specimens look somewhat unlike the San Bernardino Mountains type series, the markings are darker, the sides of the prothorax a bit more strongly rounded, but these characters are, I think, of little or no consequence, nor can I find any others that are constant. The Williams males are like the Nogales ones and the sole female is not distinguishable in any way from the San Bernardino Mountains females. The Santa Rita Mountains specimens are rather more densely punctate—as a group—than any other series of specimens before me, but other examples from one locality or another approach them in this respect. *Mobilis* is, on the whole, quite close to *quadratus*, but the two species are, I believe, capable of separation by the tabular characters.

89. ***Pachybrachys delumbis*** new species

Very closely allied to *mobilis*; sculpture virtually the same, size a little smaller, eyes a little closer, more noticeably so in the female, in which they are separated by two and one-fourth to two and one-half times the length of the basal antennal joint; front claws of male only slightly larger than the others, and scarcely more noticeably so than in the female. In the male type the vertex spot is large, but the frontal spot is narrow and the front is mostly yellow; the thoracic M is quite distinct, attaining the apical third, the thorax predominantly yellow. Elytral spots rather small, the outer series and the posterior inner one distinct, two anterior spots of the inner series not defined; marginal interspace with two punctures just back of the strong sigmoidal dislocation of the eighth stria, and three more at the anal curve. In a second male the entire head and upper surface are yellow with all spots very small and faint, pale brown in color; legs as in *mobilis*. In the female the markings are fuscous throughout, those of the head, prothorax, and inner row of elytral spots broadly suffused, the head and thorax predominantly fuscous, the elytra with the dark areas a little in excess; tibiae blackish except at base, femoral rings broad, leaving the base and apex pale.

Length 2.4 to 3.1 mm.; width 1.35 to 1.75 mm.

Distribution.—*Texas*: Davis Mountains, July 6 (H. A. Weuzel).

90. **Pachybrachys pluripunctatus** new species

Dull dirty yellow, densely punctate, with obscure nebulous dark brown or fuscous standard spots; eyes separated by the vertical width of their upper lobes in the male, front without ocular lines; front claws of male obviously but not very strongly enlarged. Ave. length 3.5 mm. California.

Head thickly punctate, dirty yellow, with broad vague darker standard markings; eyes separated in the male by one and three-fourths times the length of the basal antennal joint or rather more, and by nearly three times the length of the basal joint in the female. Antennae attaining the hind coxae in the male, a little shorter in the female, blackish, more or less paler toward the base, tenth joint scarcely two and one-half times as long as wide.

Prothorax moderately transverse, widest a little in advance of the base, sides obviously but not strongly convergent in front; punctuation dense, narrowly sparser along the side margins; M varying from broad and diffuse to obsolete.

Elytra broadly densely diffusely punctate on the disk, more or less striate at sides and rear, especially in the male, the female with three feebly prominent narrow and subentire interspaces included between striae one to two, three to four and seven to eight, these being also detectable in the male; marginal interspace wide, closely punctate throughout; shield distinct but small.

Pygidium blackish with rather small subapical yellow spots. Body beneath blackish, last ventral with lateral pale spot. Legs variable from rufotestaceous with black spots or bands to almost entirely fuscous.

Length 3.1 to 3.8 mm.; width 1.6 to 1.9 mm.

Distribution.—*California*: Carmel, Monterey Co., Oct. 29, type ♀ (Van Dyke); San Mateo Co., Aug. (Nat. Mus. Coll.); Santa Cruz Mountains (Nat. Mus.); Pasadena, Dec. 22, 1 female not quite typical.

91. **Pachybrachys bajulus** Suffrian

Luteous, alutaceous, not or feebly shining, prothorax trivittate with black, the vittae not or scarcely connected in front; elytra narrowly black along the suture and with the lateral bead black, the standard spots nearly or quite wanting except that on the shoulder knob; eyes (♂) slightly more widely separated than the vertical width of their upper lobes; front without ocular lines; elytral striae fairly regular; front claws a little larger than the others in the male. Ave. length 2.4 mm. Arizona.

Head not wider than the thoracic apex, front sparsely punctate in the pale areas, more closely but not densely in the dark markings, which are rather broad. Eyes separated in the male by fully one and three-fourths, and in the female by rather more than twice the length of the basal antennal joint; antennae moderate in length, the outer joints blackish, the tenth scarcely three times as long as wide.

Prothorax moderately narrowed in front, sides broadly rounded, slightly incurved basally, with a short faint sinuation before the hind angles; punctuation uneven, sparse except in the black areas, side margins smooth; M broadly marked, the middle stripe entire, broader in front and sometimes divided by a narrow pale line, or enclosing a small elongate pale spot, but not as a rule connected with the lateral stripes.

Elytra irregularly punctate baso-suturally, striae lightly impressed and all more or less distinct, the fifth and sixth confused in front of the middle, the eighth nearly straight; shield rather small, elongate triangular; marginal interspace with two or three punctures sub-basally and sometimes one or two further back.

Pygidium black with the usual yellow spots. Body beneath black, abdomen with the tip and narrow side margin more or less pale. Legs pale with rather broad black femoral rings, the tibiae more or less blackish or dusky in apical half.

Length 2.2 to 2.6 mm.; width 1.2 to 1.4 mm.

Distribution. *Arizona:* Williams, July 3; also taken here July 20, and a Flagstaff, July 5, by Barber & Schwarz; "Ari" (Horn Coll.).

I have based my identification of this species on a specimen from Orizaba, Mexico, so identified by Jacoby and kindly sent me for study by Mr. C. J. Gahan of the British Museum. This specimen has the thoracic markings less conspicuously vittiform than in most of our representatives but the difference is probably of no consequence and I find nothing else to support it.

92. *Pachybrachys nobilis* new species

Very large, yellow, prothorax rather finely and closely reddish brown punctate, with small but diffuse rust colored basal spots, the markings becoming in some examples—notably females—darker and more extended. Elytra with black standard spots, those of the inner series often more or less longitudinally confluent; punctuation in great part confused. Antennae very slender, filiform. Eyes distant; a faint trace of ocular lines very near the eyes. Pygidium broadly margined in the female; front claws of male small. Ave. length 5.8 mm. *Arizona.*

Head scarcely as wide as the thoracic apex, front moderately punctate, more closely in the female, supra-orbital groove rather deep and extending faintly along the inner margin; markings variable in development, the front predominantly yellow. Eyes separated in the male by twice the length of the basal antennal joint, and by two and one-fourth times the length of the basal joint, or a little more, in the female. Antennae nearly as long as the body in the male, three-fourths the length of the body in the female, very slender, the joints nearly filiform, the tenth four or five times as long as wide, outer joints dusky, basal joint darker above.

Prothorax rather long, sides strongly rounded at basal fourth, incurved at base, straight or nearly so and strongly convergent in front, punctuation close, narrowly sparse along the side margins, markings usually small and diffuse, representing the basal portions of the standard M.

Elytra less than two and one-half times as long as the prothorax, punctures somewhat coarser than on the prothorax, variable in density, for the most part confused, but with some traces of serial arrangement here and there, especially toward the sides, these quite unimpressed on the disk, and only feebly so at sides; one or two more or less complete lateral striae are usually evident in the male, these being often more or less irregular or double in the female; marginal interspace punctured toward the base only; shield wanting; standard spots black, the outer series rather sharply defined, the inner ones sometimes so, but frequently more or less confluent lengthwise and irregularly disintegrated.

Pygidium blackish with two large rounded narrowly separated subapical pale spots. In the female the pygidium is flatter than in the male and there is an entire broad and thin reflexed margin, which is wanting in the latter sex. Body beneath variable in color, from almost entirely rufo-testaceous to blackish with the greater part of the last ventral, and the sides and apical half of the preceding segments, yellow.

Legs yellow, the femora with faint median rufo-testaceous clouds.

Length 5.2 to 6.5 mm.; width 2.5 to 3.2 mm.

Distribution.—*Arizona*: Williams, June 30 to July 20 (Barber & Schwarz); Huachuca Mountains, 9,000 ft., July 5 (Beyer); Palmerlee, July 11 (Wenzel); Santa Rita Mountains, 5,000 to 8,000 ft., July (Snow).

The type series was taken at Williams. The specimens from the Huachuca and Santa Rita Mountains average a little larger, and those from the Huachuca—females only—have the prothoracic markings blackish and more complete. This is the largest species in our fauna. A specimen from the Santa Rita Mountains (Snow Coll.) bears a label "*longulus* Suffr.?" in Bowditch's handwriting. Our species does not fit Suffrian's description in a number of particulars and I hardly think it possible that the two are the same. According to the description of *longulus* the thorax is short and broad, the elytra more than three times as long as the latter, and the markings are entirely rust colored. Smaller specimens of this species resemble somewhat closely some examples of *fuscipes* var. *purgatus*; for a statement of differences see remarks under the latter.

93. *Pachybrachys fuscipes* new species

Dull dirty yellow, pronotum more or less completely suffused with reddish brown, with the M imperfectly and obscurely represented by darker brown or fuscous shades; elytra similarly suf-

fused with reddish brown in some specimens, not appreciably so in others, the standard spots present, blackish, punctuation almost entirely diffused; eyes distant, front without ocular lines; front claws of male not appreciably enlarged. Ave. length 4.5 mm. New Mexico; var. *purgatus* Arizona.

Head not at all wider than the thoracic apex, front flat, thickly nearly uniformly punctured, the spots diffuse and often ill-defined or subobsolete. Eyes (σ) separated by two and one-half times, or (φ) by about three times the length of the basal antennal joint, which is rather small. Antennae about two-thirds as long as the body in the female, the tenth joint fully three times as long as wide.

Prothorax widest and rather strongly rounded at about the basal fourth, the sides nearly straight and rather strongly convergent toward the front, incurved posteriorly and with a small but distinct sinuation before the hind angles, which are right or a little acute; disk densely punctate throughout, the side margins less densely so but not smooth; markings obscure and generally evanescent anteriorly, the basal ends of the M being best defined.

Elytra thickly diffusely punctured throughout, the submarginal stria alone evident, and this more or less double or confused; disk with one or two slightly costiform lines in some females; marginal interspace with numerous punctures anteriorly and a few behind the middle; shield wanting. The median and posterior pairs of spots are often subcontiguous, forming two transverse fasciae, of which the median one is shorter and extends only about half way to the suture.

Pygidium black, with apical and smaller median marginal dull yellow spots. Body beneath blackish, the last ventral segment often varied with yellow. Legs in great part infuscate, the thighs more or less pale at base.

Length 4 to 4.9 mm.; width 2 to 2.6 mm.

Distribution.—*New Mexico*: Clouderoft, June 11, σ type (Knaus); Beulah (Beyer); Las Vegas Hot Springs, Aug. 9 (Barber & Schwarz).

Var. ***purgatus*** new variety

Similar in all essentials to the type form but of a generally brighter more rufo-testaceous color, with the legs concolorous. In some examples the entire upper surface is rufo-testaceous with only the shoulder knob darker.

This varietal form is based on a series taken by Barber and Schwarz at Williams, Arizona, June 30 to July 20. Two examples from the Huachuca Mountains (Schaeffer) vary in the color of the legs toward the typical *fascipes*, but the legs are still predominantly pale.

There is a rather striking resemblance between this form and some specimens of *nobilis*, which illusion is heightened by the fact that both species were taken at the same place and on the same dates by Messrs. Barber and Schwarz. The present species is, however, easily distinguished from *nobilis* by its more distant

eyes, less slender antennae, still more confused elytral punctuation, broader front tarsi, normal pygidium and smaller size.

94. **Pachybrachys sanrita** Bowditch

Of more than average size, prothorax broadly suffused with reddish brown, elytral markings black or dark brown, predominant, and usually confluent in such fashion as to leave the apex, two lateral transverse fasciae (often more or less broken), the shield, some short basal lines, and scattered small spots near the suture, yellow. Eyes (σ^7) evidently though not greatly more distant than the vertical width of their upper lobes; ocular lines wanting; front claws of male not appreciably enlarged. Ave. length 4 mm. Arizona.

Head barely as wide as the thoracic apex, unevenly rather finely punctured, the darker areas diffuse, reddish brown, sometimes almost obsolete. Eyes separated in the male by about twice and in the female by about three times the length of the basal antennal joint. Antennae yellow, outer joints blackish, fully three-fourths as long as the body in the male, the tenth joint fully three times as long as wide; scarcely more than half as long as the body in the female, the tenth joint less than three times as long as wide.

Prothorax widest at about basal fourth, sides nearly straight and distinctly convergent anteriorly, rounded in a little at base, with a slight sinuation before the angles; punctuation somewhat uneven, not very close, side margins narrowly smooth; M broadly suffused, leaving the side margins and front angles and two more or less obvious basal spots and a narrow median anterior line, yellow.

Elytral striae quite irregular, the second, third and eighth best defined, the discal ones slightly, the eighth distinctly impressed; second and third interspaces wide behind the middle; the shield distinct, yellow; discal series of punctures often showing a tendency to become irregularly double; submarginal stria strongly sinuous, marginal interspace without punctures; outer spots connected with the corresponding inner ones, the latter completely confluent longitudinally, leaving only the suture and some small adjacent spots, the basal margin, two or three narrow basal spots, the shield, two larger transverse lateral spots, and the apex, yellow.

Pygidium brown with apical yellow spots. Body beneath brown, last ventral partly yellow. Legs rufo-testaceous, the tips of the middle and hind femora pale yellow.

Length 3.7 to 4.25 mm.; width 2 to 2.25 mm.

Distribution.—*Arizona*: Santa Rita Mountains (Snow); Huachuca Mountains (Schaeffer), (Leng), (Beyer); Palmerlee, Cochise Co., July (Schaeffer), (Wenzel).

95. **Pachybrachys atomarius** Melsheimer

Fuscous, speckled with few to many small yellow spots, lustre dull, punctuation dense, elytral striae defined only toward the rear and sides, pygidium entirely black; eyes rather distant, ocular lines wanting, front claws of male not appreciably enlarged. Ave. length 2.6 mm. Eastern United States.

Head not wider than the prothoracic apex, in the typical form predominantly yellow and sparsely punctured in the male; the fuscous spots more extended, the dark areas usually predominating, the punctuation closer in the female. Eyes (σ^7) separated by twice the length of the basal antennal joint or slightly less, and by about two and three-fourths times the length of the basal joint in the female. Antennae not especially slender, about three-fourths as long as the body in the male, yellow, becoming blackish toward the tip, the basal two or three joints more or less blackish above as usual, tenth joint about two and one-half or two and three-fourths times as long as wide.

Prothorax moderately narrowed in front, sides broadly arcuate, a little more strongly so behind the middle, surface densely punctate to the extreme margins.

Elytra densely confusedly punctate over a large part of the disk, with fragments of striae on the convexity and toward the sides, especially posteriorly; eighth stria and sometimes the seventh fairly well defined throughout; marginal interspace punctate throughout; shield small, convex, yellow, and usually fairly conspicuous.

Pygidium and body beneath entirely black. Legs black and yellow, the colors variable in extent, hind tibiae entirely black, or at most suffusedly yellowish for a short distance at base.

Length 2.2 to 3 mm.; width 1.15 to 1.7 mm.

Distribution.—*New York:* Staten Island (Leng); West Hebron, June 20 (Leng); Mt. Vernon (Sherman); N. Y. (Nat. Mus. Coll.). *New Jersey:* Snake Hill (Liebeck). *Pennsylvania:* Pocono Lake, July 28 (Wenzel); "Pa." (Melsheimer Coll.). *West Virginia:* White Sulphur Springs, July (Fenyess). *North Carolina:* (Leng Coll.). *Alabama:* Mobile and vicinity, April and May (Loding); Wadley (Soltau—Nat. Mus. Coll.). *Florida:* Key West (Leng). *Kentucky:* (Soltau—Nat. Mus. Coll.). *Ohio:* Cincinnati (Dury); Ohio (Hubbard & Schwarz). *Michigan:* Detroit (Hubbard & Schwarz). *Indiana:* Indianapolis, July 11. *Illinois:* "X. Ill.," Bloomington, June 8 (Wickham). *Iowa:* Iowa City, May 19 to 23, Tillin, June 5; Chariton (all in Wickham Coll.). *Arkansas:* Little Rock (Wickham). *Missouri:* St. Louis (Knaus); Salina (Knaus); "Mo" (Nat. Mus.). *Kansas:* McPherson (Knaus); Douglas Co. (Snow); "Kan" (Nat. Mus.). *Nebraska:* Lincoln (Wickham); "Neb." Snow. *Manitoba:* Winnipeg (Wickham Coll.).

As indicated in the diagnosis, this species varies greatly in its mottling. At one extreme the black or fuscous surface is only relieved by a few small scattered yellow flecks, which may rarely be entirely lacking on the head and prothorax; at the other

extreme the yellow is strongly predominant, the darker mottling being mainly due to the very numerous and irregularly disposed dark punctures, which on the prothorax are then usually aggregated so as to show vague traces of standard spots. In general the females are darker than the males. The front legs are often in great part yellow, the thighs with a long black spot above; the middle and hind thighs may be described as yellow broadly banded with black, or black with base and tip yellow. The front and middle tibiae are usually in part yellow, the hind tibiae are typically dark throughout, but are slightly yellow at base in some examples. Occasionally in very dark examples the legs are almost entirely black; there appears always, however, to be a small yellow spot at tip of middle and hind thighs, and usually on the front face of the anterior thighs. In the large series before me, which I have assigned to this species, I note a little variation in the width of the front between the eyes, these being slightly but distinctly less distant in a series from Mobile, Ala., this, however, is not correlated with any other characters that I can discover. The front claws of the male are not appreciably enlarged, that is to say—they are on careful comparison only very slightly larger than those of the middle and hind feet. Some trifling variation in the size of the front claws is discernible in the series at hand but it does not appear to me to be significant.

Great uncertainty has prevailed up to this time as to the identity of the true *atomarius* of Melsheimer, and about all the small mottled species of the Atlantic Coast region appear under this name in the various collections which I have examined. Halde- man, who wrote but a few years after Melsheimer, assumed the species to be the same as *femoratus* Oliv. and so placed it, with a query; he then proceeds to describe the real *atomarius* as his own *infaustus*. Suffrian probably had authentic specimens of both *atomarius* and *infaustus*, for while he gives descriptions of both, he expresses doubts as to the distinctness of the latter. LeConte, strangely enough, was entirely off in his interpretation, using the name *atomarius* for the *peccans* of Suffrian. Recently, Bowditch has followed LeConte, and redescribes some of the paler western specimens of *atomarius* as his *atomus*.

A critical study of material from the Melsheimer collection, now contained in the Museum of Comparative Zoölogy at Cambridge, enables me to fix with almost absolute certainty the

identity of this species, and shows that the *infaustus* of Halde-
man is completely synonymous.

Several species in the vicinity of *atomarius* are easily confused
with it, and the following additional tabular statement is offered
as a further guide to the student. Although *stygius* is tabulated
with the black species it is really closely allied to *atomarius*, and
is therefore included here.

Eyes not at all prominent, prothorax rather shorter and less narrowed in front,
the sides if produced passing tangent to the eyes or scarcely intersecting them;
basal joint of antennae more or less pale beneath, at least in the ♂; pygidium
without pale spots **atomarius**

Eyes a little prominent—most noticeably so in *cephalicus*, the prothorax
slightly longer and more narrowed in front, the sides if produced intersecting
the eyes; basal antennal joint black or picaceous with at most the tip only nubli-
ously paler.

Antennae more slender, the tenth joint in the ♂ three to four times as long
as wide; pygidium with subapical yellow spots more or less developed.

Tenth antennal joint of ♂ about three times as long as wide, eyes less
prominent, sides and apex of elytra more distinctly striate. **obfuscatus**

Tenth antennal joint of ♂ nearly or quite four times as long as wide,
eyes more prominent, elytral punctuation more broadly confused, hind
tibiae pale in apical half (more or less). **cephalicus**

Antennae less slender, the tenth joint in the ♂ about two and one-half
times as long as wide, and in the ♀ but little more than twice as long as
wide; hind tibiae entirely black or picaceous, pygidium without spots (rarely
obscurely indicated in *vestigialis*).

Elytral punctuation very dense and confused almost throughout, even
the lateral striae in great part broken up; color varying from entirely
black to thickly speckled with yellow. **vestigialis**

Elytral punctures less dense, several striae—usually three, four, seven and
eight—well defined and entire or subentire; color entirely black or with a
few very small scattered yellow flecks on the elytra³. **stygius**

96. **Pachybrachys vestigialis** new species

Very close to, and possibly not distinct from *atomarius*. It varies in color
from almost entirely black (typical) to the usual confusedly mottled form so
frequent in *atomarius*. In the type the head has two small obscure yellow
spots on the vertex, two or three others very small and barely discernible on
the prothorax, and on the elytra a few small brighter yellow spots along the
base and in an irregular transverse line behind the middle, of which the bright
yellow dot-like shield is the most conspicuous; middle and hind thighs with a
small yellow apical spot. In another example the shield is dimly visible, the
other pale spots nearly or quite obliterated, the head, prothorax and legs en-
tirely black. The basal joint of the antennae is entirely black, second joint

³ Rarely with the yellow spots more numerous.

brownish, following joints yellow, the outer three or four infuscate. Eyes a little more distant than in *atomarius*, being separated in the male by a little more than twice the length of the basal antennal joint. Punctuation of upper surface very dense throughout, and even more broadly confused than in *atomarius*, with few indications of stria arrangement, chiefly along the sides, and these scarcely at all impressed.

The slightly more distant eyes, which are a trifle more prominent, entirely black basal joint of the antennae, and rather dense more completely confused elytral punctuation will, I think, enable the student to separate this from *atomarius*.

Distribution.—*Kansas*: Medora, June 10, type ♂ (Knaus); Clearwater. *Nebraska*: Sand Hills (Nat. Mus. Coll.). *Oklahoma*: So. McAlester, June 11 (Wickham). *Texas*: Columbus, May 16 and July 8 (Hubbard & Schwarz); San Diego, May 24 to 26 (Hubbard & Schwarz); Dallas (Wickham); Maedona, July 29; Flatonia, July 30 and Seabrook, Aug. 9 (Wenzel). *Mississippi*: Vicksburg, May 27 (Soltau—Nat. Mus. Coll.).

97. ***Pachybrachys obfuscatus*** new species

Again very nearly identical with *atomarius*, distinguishable only as follows. The front, which in the male of *atomarius* is yellow with a linear or narrowly triangular median dark spot, is here predominantly fuscous and more closely punctate; the eyes are a little less distant than in *atomarius* being separated by about one and three-fourths times the length of the basal antennal joint, or slightly more; the front claws of the male are a little larger than in *atomarius*, and the pygidium is maculate with dull yellow—entirely black in *atomarius* so far as I have observed.

Distribution.—*North Carolina*: Black Mountains, June (Van Dyke), type ♂. *Georgia*: Clayton, 2,000 to 3,700 ft. (Leng). *New York*: Several examples without definite locality are associated provisionally. They agree remarkably well except that in one example the eyes are as widely separated as in *atomarius*.

It may be very difficult to separate specimens of this species from dark colored examples of *roboris*, but the latter nearly always has brown or rust colored markings—especially in the females—and if a series of this latter species is present there is likely to be no difficulty in separating them; the two species are, however, very closely allied.

98. ***Pachybrachys stygius*** new species

Robust, black, with or without a few very small yellow flecks on the elytra, rarely with numerous small yellow spots on both thorax and elytra; lustre dull, punctuation rather dense; eyes distant, front without ocular lines; front claws of male not appreciably enlarged. Ave. length 2.85 mm. *Georgia*; *Florida*; *Alabama*.

Head scarcely wider than the thoracic apex, but with the sides of the thorax if produced forward, intersecting the eyes; front moderately punctate; eyes separated in the male by twice the length of the basal antennal joint or slightly more, and by about two and three-fourths times the length of the basal joint in the female. Antennae rather short, black, brownish yellow toward the base, the basal joint black, second joint rufo-piceous, tenth about two and one-half times as long as wide in the male, and but little more than twice as long as wide in the female.

Prothorax moderately transverse, rather strongly arcuately narrowed in front, surface closely, moderately coarsely, somewhat unevenly punctate, with scattered small slightly elevated smooth areas; lateral margins not smoother.

Elytra rather densely punctate, punctures but little larger than those of the prothorax, broadly confused on the disk, serially or subserially arranged at the rear and sides, striae three, four, seven and eight usually traceable more or less completely, lateral interspace punctate; shield small but distinctly elevated, black or yellow.

Pygidium, body beneath, and legs black.

Length 2.75 to 3 mm.; width 1.6 to 1.8 mm.

Distribution.—*Florida*: Enterprise, type ♂; Jacksonville (Nat. Mus. Coll.); Van Duzee—Wickham Coll.; Sanfordville (Wickham Coll.); Ormond and Atlantic Beach (Mrs. Slosson—Liebeck Coll.); Key West (Leng Coll.). *Georgia*: (Leng Coll.) (Morrison—in Snow Coll.). *Alabama*: Langdale, Chambers Co. (H. H. Smith—Nat. Mus. Coll.); "Ala" (Leng Coll.).

This species has been confused with *carbonarius* in a number of collections, but may be easily distinguished by the coarser, less even prothoracic punctuation, which is but little finer than that of the elytra. It is really more closely allied to *atomarius* and *rustigialis*, black examples of the latter being strikingly similar and separable only by their denser more completely confused elytral punctuation. Very dark feebly maculate specimens of *atomarius* are much like those examples of *stygicus* that are not totally black, but they may be separated by careful attention to the characters as tabulated in the remarks under *atomarius*.

99. ***Pachybrachys iachrymosus*** new species

Black, strongly alutaceous and dull, front with faint obscure rufo-testaceous marks between the eyes in the male, in which sex the apical margin of the prothorax, and basal margin of the elytra in part, are very narrowly of the same color; eyes separated in the male by twice, and in the female by three times the length of the basal antennal joint; front without ocular lines, elytra with only the submarginal stria entire, front claws of male not appreciably larger than the others. Ave. length 2.9 mm. Arizona.

Head not appreciably wider than the thoracic apex, but the eyes are somewhat prominent and intersected by the sides of the prothorax if produced. The front may be regarded as dull rufo-testaceous with heavy black standard markings, but the paler areas are small and very obscure. Antennae moderate, attaining the hind coxae in the male, black, brownish rufous toward the base, tenth joint scarcely three times as long as wide.

Prothorax moderately transverse, widest at about the basal fourth, sides moderately arcuately convergent in front, surface densely, a little unevenly, punctate, with small scattered more convex smooth areas; sides in the male with a narrow, smooth, dull, rufo-testaceous or rufo-piceous margin; in the single female associated, without smooth margin, the punctures dense to the extreme edge.

Elytral punctuation scarcely coarser on the average than that of the prothorax, in great part irregular, the eighth stria entire and distinctly impressed, the seventh traceable, the others feebly impressed, represented only in a fragmentary way and most noticeable on the convexity; shield indistinct or wanting; marginal interspace with a few punctures at base only in the male, punctured throughout in the female. In the male the raised basal margin is in part rufous and there is a very obscure apical spot in one example.

Body beneath and legs black or piceous, the ends of the femora gradually more or less rufo-piceous.

Length 2.8 to 3 mm.; width 1.6 mm.

Distribution.—*Arizona*: (Am. Ent. Soc. Coll.), 2 males, 1 female.

The female is the smallest of the three examples and is entirely black. This species is in most respects very like *stygicus*, but is a little shorter and stouter in form, with the elytral striae more evident and the sides of the thorax scarcely at all smoother in the male. The form and color is greatly like that in certain specimens of *signatifrons*: the latter, however, is distinctly shining, the elytral striae much better defined and the front claws of the male a little larger.

100. ***Pachybrachys cephalicus*** new species

Robust, fuscous and dull yellow mottled, the former color predominant on head and prothorax, the latter (typically) on the elytra; lustre dull; punctuation dense and largely confused; eyes more prominent than the front angles of the prothorax, moderately widely separated, ocular lines wanting; front claws of male not appreciably enlarged. Ave. length 3.1 mm. Gulf and Atlantic Coast States.

Head closely punctate, maculation heavy, eyes separated by about twice the length of the basal antennal joint in the male, and by about two and three-fourths times the length of the basal joint in the female. Antennae thin,

about four-fifths as long as the body in the male, the tenth joint fully four times as long as wide, basal joint entirely blackish, outer joints infuscate.

Frothorax only moderately transverse, sides broadly arcuately convergent from the base or very near it, punctuation dense, sides not smoother; surface predominantly fuscous, mottled with dull yellow, the usual two basal and anterior median spots most conspicuous.

Elytra only about one-eighth longer than wide, dull yellow with blackish brown punctures for the most part, confusedly disposed on the disk but tending to form irregular or sinuous lines toward the sides and apex, the two outer striae fairly continuous and entire; strial lines feebly impressed, marginal interspace punctate, shield small but convex and distinct; marginal series of standard spots feebly indicated, discal ones scarcely so, but with a tendency to some fuscous suffusion along the suture.

Pygidium black with two oval yellow spots and between these and the side margin and contiguous to the latter a small yellow dot. Body beneath blackish, last ventral with a lateral yellow spot. Front thighs yellow with base and upper surface blackish, front tibiae largely yellow; middle thighs yellow in outer half, the tibiae pale in basal half.

Length 2.9 to 3.25 mm.; width 1.6 to 1.8 mm.

Distribution.—*Alabama*: Mobile, June (Loding), type ♂. *Georgia*: (Liebeck Coll.). *Mississippi*: Agricultural College, July (Weed). *Louisiana*: Opelousas (Wenzel); Cameron, Aug. 19 (Dury).

The specimens aggregated under the name *cephalicus* are seen on closer inspection to involve several more or less distinct types, two of which, for the purposes of a more discriminating cabinet arrangement, may with advantage be given varietal names. It is possible that one or both of these may be distinct from the larger typical form, but until a more extensive material shall have become available for study I prefer to give them only varietal standing.

Var. **dixianus** new variety

Smaller than the typical form—2.5 to 2.8 mm.—the eyes slightly less prominent, the elytral maculation relatively a little coarser, the pale yellow and blackish spots prettily contrasting, the shield relatively larger, the marginal interspace more sparsely punctate or even subimpunctate in posterior half.

Distribution.—The types (♂ and ♀) were taken at Tumbling Gap in Northern Alabama by Mr. Loding. A specimen from Meridian, Miss. (Soltau in Nat. Mus. Coll.), and another from "Barlow" (Miss.?) are closely similar.

Var. **parvus** new variety

Still smaller than *dixianus*—2.2 to 2.6 mm.—Eyes as in *dixianus*—a trifle less prominent than in typical *cephalicus*, the elytral shield smaller relatively than in typical *cephalicus*, and very distinctly smaller than in *dixianus*; quite similar to the typical form in the broadly confused punctuation, the

marginal interspace numerous punctate and the striae irregular or fragmental and lightly impressed; prothoracic markings less broadly suffused, the general color lighter in tone, eyes a little closer, especially noticeable in the female, in which they are separated by only twice the length of the basal antennal joint or slightly more.

Distribution.—*New York*: The type is a male from Mr. Leng's Collection and was taken in the vicinity of New York City. Other examples from Mr. Leng bear the label "L. I." (Long Island). *Massachusetts*: Framingham, Aug. 4, 1907 (Frost). *New Jersey*: (Leng Coll.); Angelsea (Van Dyke Coll.). *Maryland*: Plummer's Island, Aug. 2, a female collected by Schwarz. *Georgia*: Tybee Island, July 2 (Wenzel). *Alabama*: Wadley (H. H. Smith—Nat. Mus. Coll.).

101. ***Pachybrachys roboris*** new species

Yellow, with close set reddish brown or rust colored punctures and standard spots, the latter diffuse and variable in development, and in some examples—more especially males—becoming dark brown or fuscous in shade; eyes moderately distant, front without ocular lines; front claws of male slightly larger than the others. Ave. length 2.8 mm. Eastern half of United States.

Head closely punctate, spots rather broad, eyes slightly prominent, separated by from one and three-fifths to one and seven-eighths times the length of the basal antennal joint in the male, and from two and two-thirds to three times the length of the basal joint in the female. Antennae about three-fourths as long as the body in the male, barely half the length of the body in the female, the basal joint dark above, the outer joints infuscate, tenth in the male scarcely three times as long as wide.

Prothorax widest well in advance of the base, the sides at this point rather strongly rounded or subinflated in the male, less strongly so in the female; the M broadly diffuse, leaving the usual pale areas more or less nebulously defined, the punctuation in the latter a little less dense and somewhat uneven, leaving small scattered slightly convex yellow spots; side margins not smoother, or only narrowly and incompletely so.

Elytra densely confusedly punctate with fragments of striae toward the sides and rear, the lateral striae more or less distinct, and often—especially in the female—with one or two slightly prominent discal costae defined by punctures; marginal interspace punctate, more closely and confusedly so in the female; shield small, irregularly rotundate, yellow; standard spots vaguely indicated on the disk, the three marginal ones fairly distinct.

Pygidium brown with two oval yellow subapical, and a smaller lateral spot, the latter sometimes obscure or lacking. Body beneath brown, last ventral segment in great part yellow. Front legs brown and yellow, typically marked, but variable in proportion of colors; middle and hind thighs brown with extremities pale, the corresponding tibiae brown and usually only feebly and indefinitely paler at base, but occasionally with the basal third distinctly yellow.

Length 2.4 to 3.2 mm.; width 1.3 to 1.8 mm.

Distribution.—*Massachusetts*: Malden, July 15 (Frost) (type ♂; Lowell (Blanchard)). *New York*: Buffalo; "N. Y." (various collections). *New Jersey*: (Leng), (Van Dyke Coll.). *District of Columbia*: Washington (Hubbard & Schwarz); D. C. (Leng Coll.). *Maryland*: Plummer's Island (Nat. Mus. Coll.); Jackson's Island, June 22 (Barber—Nat. Mus. Coll.); "Md" (Liebeck). *Virginia*: Pennington Gap, July 8, and Afton (Hubbard & Schwarz). *North Carolina*: Black Mountains; June (Van Dyke); Raleigh, early July (Sherman). *Alabama*: Mobile, May 25 to June 1 (Loding); Tumbling Gap, June 3 to 8 (Loding); Oak Grove (Soltau—Nat. Mus.). *Florida*: Jacksonville (Asmead—Nat. Mus. Coll.). *Ohio*: Cincinnati (Dury). *Illinois*: Quincy, June 14; Algonquin (Nason); So. Ill. (Soltau). *Missouri*: "C. Mo" (Nat. Mus. Coll.). *Arkansas*: Little Rock (Wickham). *Mississippi*: "S. Miss" (Soltau); Meridian, July 12 (Soltau). *Kansas*: Salina (Knaus); Douglas Co. (Dyche—Snow Coll.) Kans. (Snow). *Nebraska*: Plattsmouth (Shimek). *Oklahoma*: Atoka, June 13 to 15 (Wickham). *Texas*: Columbus, June to Aug. (Hubbard & Schwarz); San Diego, May 30 (Schwarz); Flatonia, July 30 (Wenzel); Green Valley, Chisos Mountains, Brewster County, July 14 (Wenzel); Cypress Mills, April to July (Leng); Brownsville, Aug. (Beyer); "Tex" (various collections).

This, as indicated by the localities, is a widespread and common species and exhibits a good deal of variation. The general aspect is ferruginous in the female owing to the dense diffuse punctuation and lack of definite markings. In the male the colors are more contrasting, the punctuation a little less dense, with more obvious striae. The width of the front between the eyes is less constant than usual, and in a male example from Jacksonville, Florida, the eyes are distinctly closer than the vertical width of their upper lobes, but in a second male from the same place the eyes are nearly normally distant. It should be noted that in these two males the front claws are a little larger than is usual in the species, but I do not think this of much weight in view of the obvious tendency in the long series at hand to vary in these respects.

That so common a species as this, and one so generally dispersed throughout the Atlantic Region should as yet have received no name is almost incredible, and I have persistently refrained from giving it one until there seems to be no other course to pursue. There is, to be sure, no lack of names applied to the species in various collections, and in the National Museum Collection alone it appears under no less than five—viz. *infaustus*, *atomarius*, *femoratus*, *pectoralis* and *conformis*. In the Horn Collection it goes as *sobrinus*, while more recently Bowditch has identified it as *sputariarius*. This last name has seemed to be the most likely one,

and it should be stated that Bowditch based his opinion on a Suffrian type (σ) sent him for study. Through the courtesy of Mr. Bowditch I was permitted to examine this type, but it did not seem to me to be identical with the present species, which conclusion is confirmed by a recent study of a female type of *spumarius* sent me by Dr. Tasehberg. Further remarks on this matter will be found under *spumarius*.

102. **Pachybrachys spumarius** Suffrian

From a female specimen—supposedly a type or cotype—from the Suffrian collection, I have drawn up the following description.

Form very robust, similar in general facies to *roboris* but stouter than any example in a rather long series of the latter species now before me; general color dull yellow with dark brown punctures and rather diffuse markings.

Head thickly punctate, front flat, markings heavy; eyes separated by twice the length of the basal antennal joint. Antennae fuscous, paler toward the base, half the length of the body, the tenth joint very slightly more than twice as long as wide.

Prothorax short, strongly transverse, sides somewhat strongly rounded posteriorly, widest at about basal third, punctuation rather fine and dense, with small scattered smoother spaces, the side margins distinctly smoother, standard markings broad, brownish fuscous in color.

Elytra densely confusedly punctate as far back as the shield and nearly to the sides, the declivity deeply striate, the seventh stria scarcely impressed basally and not very well marked, the eighth stria distinctly impressed throughout and with a strong basal sigmoid sinuation; marginal interspace punctate, the punctures becoming more widely spaced and in a single series posteriorly; shield distinct, small, subtriangular, yellow; standard spots not well defined, the outer basal spot on the shoulder knob distinct, the middle outer spot nearly wanting, posterior spots confluent into a rather narrow, not very conspicuous, transverse fascia at the beginning of the declivity; inner basal spots suffused into a broad indefinite discal cloud.

Pygidium in great part yellow. Body beneath brownish, abdominal apex yellow. Legs yellow with brownish clouds on the femora and tibiae. Front claws slightly larger than those of the four posterior feet.

Length 3.25 mm.; width 1.95 mm.

This specimen bears the number "30490" but no locality label. Suffrian however gives the locality "Carolina" for certain of his specimens, while others from (or in) the Chevrolat Collection are without other locality than North America.

I am unable among the thousands of specimens at hand to match this Suffrian female, nor can I find a male that is a reasonably sure mate for it. I am however placing provisionally as *spumarius* a male from Tumbling Gap, Ala., sent me by Mr.

Loding, that I had set aside as seemingly different from *roboris* though closely allied. In it the eyes are a little closer than in typical *roboris*, the prothoracic punctures do not quite reach the side margins, leaving a narrow smooth marginal line, and the elytral striae are more deeply impressed posteriorly than in *roboris*. These differences all characterize the Suffrian specimen, the smoother side margin of the prothorax being however considerably wider than in the Tumbling Gap male. In the female of *roboris* the prothorax is densely punctate to the extreme margin, and the lateral marginal interspace of the elytra is wider and more densely punctate throughout, and the eyes are separated by from two and three-fourths to three times the length of the basal antennal joint; a combination of characters which readily separates it from the Suffrian *spumarius*.

At this point it is necessary to state a fact which may perhaps complicate the situation considerably. Six years ago, among other Suffrian types sent to Mr. Bowditch for examination, was a male of *spumarius*, concerning which, after a brief inspection, I made the following comparative notes. "Seems nearly intermediate between *varians* and *roboris*. The prothorax is less strongly rounded at sides than in *roboris*, but is nearly as in *varians*; the thoracic markings are as in *varians*, the spots a little larger however, but not so diffuse as in *roboris*; the elytra are also intermediate in sculpture, the marginal interspace well defined and with punctures nearly throughout, but so narrow that there is room only for a single series of punctures; elytral spots small and rather more diffuse than in *varians*, but less diffuse than in *roboris*, except the anterior discal one, which is diffuse and shades into the suture nearly as in *roboris*; posterior spot of discal series lacking. Eyes separated by one and one-half or one and three-fifths times the length of the basal antennal joint; front claws missing."

This sketch—in which of course the name *roboris* is now supplied, the species being then known by a number ("82")—is not entirely in harmony with the Suffrian female above described, and while the differences may be individual, there is a distinct possibility that they represent different species.

103. **Pachybrachys relictus** new species

Yellow, with moderate to broad, often more or less confluent fuscous standard markings; eyes moderately distant; antennae nearly as long as the body in the male; front without ocular lines; front claws not enlarged in the male. Ave. length 2.9 mm. New York to Tennessee.

Head not appreciably wider than the thoracic apex, rather closely punctate and broadly maculate, the dark areas predominating. Eyes separated by about one and three-fifths (σ) or two (φ) times the length of the basal antennal joint, their distance apart evidently greater than the vertical width of their upper lobes. Antennae (σ) nearly attaining the elytral apex, the tenth joint nearly four times as long as wide, yellow, with the outer joints and the upper surface of the basal two joints fuscous.

Prothorax moderately transverse, sides moderately arcuately narrowed from just before the base, M usually heavily marked leaving two basal spots, an anterior median one, the side margins and front angles, pale; punctuation moderately coarse and close, a little uneven as usual.

Elytral disk with confused punctures in the baso-sutural region, striae distinctly impressed, especially at sides and rear, where they are well defined, becoming more or less irregular or broken at middle of disk; submarginal stria with strong subhumeral dislocation; marginal interval not punctured; shield small, yellow; standard spots usually broad, sometimes isolated, but often with the discal series tending to suffusion in the sutural region, and often confluent with the corresponding marginal spots so as to leave the apex and two broken transverse fasciae yellow.

Pygidium fuscous, with the usual apical yellow spots, which vary much in size and may or may not be confluent with each other and with the two small spots at the middle of the outer margins; entirely dark in one female. Body beneath blackish, a yellow spot at side of last ventral segment. Legs black and yellow, the base and apex of middle and hind thighs, and the base of the tibiae pale yellow.

Length 2.75 to 3 mm.; width 1.5 to 1.6 mm.

Distribution.—*Massachusetts*: Framingham, Aug. 4 (Frost) type σ ; Lowell (Blanchard); Concord (Wenzel Coll.). *New York*: (Leng). *New Jersey*: (Liebeck). *Pennsylvania*: (Liebeck); Lime Rock (Wickham Coll.); Lehigh Gap, July 12 (Van Dyke Coll.). *Maryland*: Plummer's Island, Aug. 11 (Me-Atee). *Ontario*: Toronto (Blaisdell Coll.); Scotia Junction, July 27 (Wenzel). *Ohio*: (Hubbard & Schwarz). *Illinois*: (Horn Coll.). *Kentucky*: Louisville (Soltau). *Tennessee*: Nashville (Soltau). *Colorado*: One female—Am. Ent. Soc. Coll.—possibly goes here.

This species is rather widely dispersed in the northeastern United States and by good rights should possess a name given by one of the older authors, but after careful investigation I am forced to believe it as yet undescribed. Notwithstanding its wide dispersion it seems to be rather scarce, or at least only

locally common. The late Mr. Blanchard took it in numbers near Lowell, Massachusetts, as has Mr. Frost at South Framingham, but the Leng and Liebeck Collections contain only two examples each, while in the Horn Collection there is only a single specimen, and other large collections are not much better off. In the Blanchard Collection it passed as *femoratus*, and one example at least in the National Museum Collection is included under *atomarius*.

104. ***Pachybrachys carolinensis*** Bowditch

Size and general facies of *varians* but with elytra almost regularly striate; yellow, scarcely shining, with black standard markings throughout, variable in extent but clearly outlined; eyes distant in both sexes, frontal lines wanting, front claws of males not enlarged. Ave. length 2.7 mm. North Carolina; Maryland?

Head not wider than the thoracic apex, frontal and vertex spots rather heavy and closely punctate, the pale areas sparsely punctured. Eyes separated by nearly twice (σ) or by three or slightly less times (φ) the length of the basal antennal joint. Antennae reaching the middle of the abdomen in the male, the tenth joint not much more than twice as long as wide.

Prothorax moderately transverse, sides nearly straight and convergent from the basal fourth, feebly sinuate behind; punctuation uneven, thick in the dark areas, elsewhere sparse, M moderate to broad, more or less irregular but sharply outlined.

Elytra nearly regularly striate except in a small scutellar area, the striae well impressed; shield distinct, marginal interspace impunctate, striae black; standard spots well defined, usually not large, but sometimes more or less confluent.

Pygidium black and yellow. Body beneath black, with the abdominal apex yellow. Legs yellow with black rings on the thighs, and blackish shades on the apical half of the tibiae.

Length 2.5 to 2.8 mm.; width 1.3 to 1.5 mm.

Distributions.—*North Carolina*: Southern Pines, June (Mance).

Two females from Maryland in the Nat. Mus. Coll. are placed here provisionally. They agree well in general appearance and in their nearly regular elytral striae, but the eyes are less distant than in the typical form.

105. ***Pachybrachys luctuosus*** Suffrian

Small, black or piceous, prothorax with side margins and some small discal spots in the usual positions and elytra with a few small lateral spots, yellow; elytral striae deep and quite regular, punctuation confused only in the scutellar region, marginal interspace impunctate; eyes separated by one and one-half times the

length of the basal antennal joint in the male; ocular lines wanting; legs spotted, front claws of male not appreciably larger. Length 2 mm. Georgia.

The above short sketch is from a male example loaned to Mr. Bowditch by the Halle Museum and is doubtless a genuine type or cotype. The specimen is very small, not over 2 mm. long, although Suffrian's measurements show that other examples of the type series are larger. I have never seen an exact counterpart of the type, but a small series of specimens in the National Museum Collection agrees in all essentials and in general appearance with the above diagnosis, except that in the single male the small yellow spots are larger on the prothorax, and are more numerous and not confined to the sides on the elytra; the eyes also are more distant than my original sketch indicates, but it is possible that I underestimated their distance apart in the Suffrian type. In the females before me the pale spots are fewer or nearly absent on the disk, nearly as in the type. The pale sides of the prothorax are sparsely punctured or nearly smooth, the pale pygidial spots are small or wanting.

This species is closely related to *carolinensis*, and I would not be surprised if the latter were only a paler form of Suffrian's species. For the present it may perhaps be separated by the color and the possibly slightly closer eyes.

Distribution.—*Georgia*: type. *North Carolina*: Asheville. A nearly typical example sent me by Colonel Casey. *Virginia*: Pennington Gap, July 21 (Hubbard & Schwarz). *Maryland*: Plummer's Island, June 28 to Aug. 15, "On Pinus" (E. A. Schwarz). *District of Columbia*: (Hubbard & Schwarz).

106. **Pachybrachys varians** Bowditch

Robust, of medium size, predominantly yellow as a rule, the standard spots black, variably developed, lustre dull; eyes rather distant, more widely separated in the male than the vertical width of their upper lobes; front without ocular lines; elytral striae impressed, shield conspicuous; front claws of male small. Ave. length 2.75 mm. Gulf States.

Head a little wider than the thoracic apex, moderately strongly and closely punctate in the dark areas, which are generally heavily marked. Eyes (σ^7) separated by about one and three-fourths times the length of the basal antennal joint, and in the female by two to two and one-half times the length of the

basal joint. Antennae attaining the middle of the abdomen (♂), outer joints blackish, the tenth rather less than three times as long as wide.

Prothorax widest at about basal fourth or fifth, sides convergent and nearly straight anteriorly, subparallel and lightly sinuate before the hind angles; punctation rather coarse and close but somewhat uneven, the M sharply outlined though somewhat irregular and variable in development, side margins smoother.

Elytra irregularly but not densely punctate baso-suturally, striae moderately to quite strongly impressed, two to four often entire, seven to eight always so, five to six much broken before the middle, eight with a strong sigmoidal dislocation behind the humerus, marginal interspace without, or with but one or two punctures; standard spots all present, usually rather small and distinctly separated.

Pygidium with larger oblique confluent yellow apical spots, or yellow with base darker; abdomen black with sides spotted with yellow. Legs yellow, femora and tibiae with blackish spots or rings, varying from broad to nearly wanting.

Length 2.3 to 3.2 mm.; width 1.25 to 1.75 mm.

Distribution.—*Louisiana*: Opelousas, May, type (Bowditch Coll.), (G. R. Pilate in Nat. Mus. Coll.). *Alabama*: Spring Hill, near Mobile, Sept. 12 (Loeding). *Mississippi*: Agricultural College, July (H. E. Weed—Am. Ent. Soc. Coll.). *Georgia*: (J. B. Smith—Nat. Mus. Coll.). *Florida*: (Linell); Tampa, Mar. 31 to April 4; Crescent City, Sumter Co., May (all Hubbard & Schwarz Coll.); Jacksonville (Ashmead); "Fla., Jan. 30" (Lugger—Nat. Mus. Coll.); Key West (Leng Coll.); St. Petersburg, April 28 (Van Duzee—Wickham Coll.). *Texas*: Seabrook, Aug. 6 (Wenzel).

107. ***Pachybrachys conformis*** Sulfrian

Yellow, not shining, markings of head and thorax broad and sharply defined, fuscous or black, elytra with the suture and small standard spots black; eyes in the male separated by just perceptibly more than the vertical width of their upper lobes, ocular lines wanting, front claws of male not appreciably larger. Ave. length 2.4 mm. Florida.

Head slightly wider than the thoracic apex, strongly but unevenly punctate, markings heavy; eyes separated in the male by one and two-thirds to one and three-fourths times the length of the basal antennal joint, in the female by about two and one-fourth times the length of the basal joint. Antennae three-fourths as long as the body in the male, dull yellow basally, black in more than outer half, tenth joint nearly three times as long as wide.

Prothorax widest at about basal fourth, sides moderately convergent and nearly straight in front, a slight sinuation before the hind angles, surface strongly, rather densely punctate, side margins smooth; markings in the form of three vittae, the middle one widest, dilated or fusiform anteriorly, not divided or abbreviated in front; the lateral vittae usually not entire and more or less disintegrated anteriorly.

Elytra confusedly punctate along the suture and in a narrow basal triangle, stria generally traceable and somewhat impressed, four to six more or less confused anteriorly; marginal interspace rather narrow, impunctate, except about the subbasal dislocation of the eighth stria; shield distinct but not large; spots small, sharply limited, those of the outer series marginal, the posterior spot transverse but not confluent with the corresponding inner one; anterior and middle spots of the inner series often elongate, the posterior one confluent with the dark sutural stripe.

Pygidium yellow, with base and median cuspiform stripe fuscous. Body beneath brown or fuscous, sides and apex of venter more or less pale. Legs yellow, the middle and hind thighs whitish yellow in outer two-thirds, brownish at base; tibiae with brownish rings or shades in apical third.

Length 2.1 to 2.7 mm.; width 1.1 to 1.4 mm.

Distribution.—*Florida*: Tampa, March and April (Hubbard and Schwarz); Enterprise (Griffith), (Schaeffer).

Suffrian gives no more definite locality than the "Eastern Region."

I have used for this species the name borne by a specimen in the LeConte Collection. Judging from description it seems likely to be the real thing, but of this I am not sure. It is very closely allied to *varians*, which is perhaps no more than a varietal form of the present species.

108. ***Pachybrachys osceola*** new species

Yellow with brown punctures and standard spots, head very unevenly punctate, eyes separated in the males by a distance only slightly greater than the vertical width of their upper lobes; front without ocular lines; elytral striae deep, front claws of male not enlarged. Ave. length 2.5 mm. Florida.

Head closely rather coarsely punctate in the brown vertex spot and impressed median line, otherwise sparsely so. Eyes separated in the male by very slightly less, and in the female by a little more, than twice the length of the basal antennal joint. Antennae yellow, outer joints in part brown, three-fourths as long as the body in the male, tenth joint barely three times as long as wide.

Prothorax widest a little in front of the base, sides moderately rounded at this point, moderately convergent and feebly arcuate or nearly straight anteriorly; punctures sparse in the pale areas, dense in the M, which in the male type is rather small and broken, in the female somewhat broadly suffused; side margins nearly free from punctures.

Elytra irregularly punctate in a small baso-sutural triangle, the striae quite deeply impressed and entire, except five and six, which are confused before the middle, eight strongly sinuous and with a subbasal interruption; marginal interspace impunctate, shield rather large, subtriangular; standard spots fairly distinct.

Pygillum brown with yellow apical spots. Body beneath brown, last ventral yellow except at middle. Legs yellow with small rather faint brown femoral and tibial spots or clouds.

Length 2.3 to 2.7 mm.; width 1.2 to 1.4 mm.

Distribution.—*Florida*: Enterprise, June 11 (Hubbard & Schwarz). A single pair (type ♂) in the National Museum Collection.

Near *varians*, but distinct by the rather less robust form, brown instead of black markings, rather more coarsely and much more unevenly punctate head, and deeper elytral striae.

109. ***Pachybrachys quadri-oculatus*** new species

Small, stout, head and prothorax rufo-testaceous, elytra pale yellow, each with a small humeral and subapical spot black; eyes in the male separated by a distance subequal to the vertical width of their upper lobes, front without ocular lines; front claws (♂) not enlarged. Length 2.4 mm. Georgia.

Head moderately closely, coarsely, subevenly punctate, uniformly dark rufo-testaceous. Eyes slightly prominent, separated by one and one-half times the length of the basal antennal joint. Antennae moderate.

Prothorax rather long, sides broadly arcuately convergent in front from a point slightly in advance of the base; punctuation coarse and close, not conspicuously uneven in distribution, side margins narrowly smoother, standard marks feebly vaguely indicated by small slightly darker shades.

Elytra scarcely one-tenth longer than wide, about three-fourths longer than the prothorax, punctuation sinuously confused in a rather small baso-sutural triangle, striae more or less sinuous but continuous and entire except five and six, which are confused at middle, eight with a strong sigmoid dislocation near the base; marginal interspace impunctate; shield large and conspicuous, slightly more convex; standard markings represented by only the basal and apical spots of the outer series, these small and black.

Pygillum in great part yellow. Body beneath brownish, last ventral in great part pale. Legs rufo-testaceous, the apical parts of the middle and hind thighs and the basal parts of the corresponding tibiae pale.

Length 2.4 mm.; width 1.35 mm.

Distribution.—*Georgia*. The unique type is a male sent by Mr. Liebeck, who kindly allows me to retain it. It is of course quite impossible to say whether the peculiar limited maculation will hold constant in a series, hence there is some risk that the name given may not prove characteristic of the species as a whole. It seems most nearly related to *varians*, but cannot, I think, be a form of that variable species, in which the eyes are a little more distant and the form notably less stout in the same sex (♂), the elytra being here about one-fourth longer than wide. I have

never seen an example of *varians* in which the standard marks were not completely represented, though very inconstant in extent, the general tendency in variation being toward an amplification and fusing of the markings rather than a reduction. The general aspect is also very much like that of a small *lodongi*, but if this latter should ever occur with the spots of *quadri-oculatus* it may at once be distinguished by the much more distant eyes.

110. ***Pachybrachys fractus*** new species

Yellow, black punctate, and with the standard markings more or less developed on the prothorax, very small or wanting on the elytra, except the humeral spot; eyes separated by twice the length of the basal antennal joint in the male, front without ocular lines, front claws of male not enlarged. Ave. length 2.7 mm. Texas.

Head sparsely punctate in the yellow areas, densely so in the rather broad and sharply defined black markings; antennae moderate, barely attaining the hind coxae in the male, outer joints blackish, tenth three times as long as wide (♂).

Prothorax widest at or near the basal third, sides moderately rounded posteriorly, a little convergent in front; unevenly punctate; standard marks variably developed, the M quite distinct in the type, attaining only the apical third, the lateral vittae not closely connected with the furcate median one.

Elytra confusedly punctate baso-suturally, the striae as a rule irregular or fragmentary, not or but slightly impressed, eighth stria fairly distinct and one or two of the discal ones more or less so; marginal interspace sparsely punctate; shield small, not conspicuous.

Pygidium black with rather large apical yellow spots. Body beneath black, last ventral yellow at sides. Legs mostly yellow, the front thighs with a large black spot on the upper side, middle and hind thighs and all the tibiae with very small black spot.

Length 2.7 mm.; width 1.4 mm.

Distribution.—Texas. The type is a male from the Liebeck Collection which I am kindly permitted to retain. A second male in the Nat. Mus. Coll. seems identical, while a female in the same collection is doubtfully referred. All bear the label "Tex." simply.

111. ***Pachybrachys truncatus*** Bowditch

Robust, pale yellow, mottled with dark brown; prothorax scarcely narrowed in front, ocular lines wanting, front claws of male only slightly enlarged. Ave. length 2.9 mm. Arizona.

Head a trifle wider than the thoracic apex, front rather sparsely punctured, the vertex spot large, median spot moderate, sharply defined, triangular. Eyes separated by about one and three-fourths times the length of the basal antennal joint or by a distance subequal to the width of their upper lobes in the male; in the female by two and one-half times the length of the basal joint of the antennae. Antennae passing the hind coxae in the male, shorter in the female, outer joints darker as usual.

Prothorax transversely quadrate, scarcely or but just visibly narrowed in front, punctuation uneven, M moderately well defined, consisting of three basal and two median spots narrowly connected, side margins smooth.

Elytra short, less than twice as long as the prothorax in the male, striae two, three and sometimes four entire, five and six much broken except posteriorly, seven and eight well defined, the latter strongly sinuous and with the usual subbasal dislocation; shield moderate, triangular; marginal interspace with at most two or three punctures at the middle; standard spots more or less distinct, generally rather small and irregular.

Pygidium blackish at base, the yellow spots broadly confluent. Body beneath fuscous, sides and apex of abdomen pale. Legs pale with faint median clouds on the femora and tibiae.

Length 2.65 to 3.15 mm.; width 1.4 to 1.65 mm.

Distribution.—*Arizona*: Prescott and Santa Rita Mountains (Bowditch); Carr Cañon, Huachuca Mountains, Aug. (Skinner—Am. Ent. Soc. Coll.). Specimens from the Santa Rita Mountains, collected by Snow, one bearing the name *truncatus* in Bowditch's handwriting are before me. These are a little less shining than the Prescott type (which I have seen) but seem otherwise identical. In the type the head is barely visibly minutely alutaceous, the prothorax and elytra polished. In the Santa Rita examples the entire surface is very minutely alutaceous, but somewhat shining.

112. *Pachybrachys precarius* new species

Pale yellow with sharply defined fuscous markings, the elytral spots small; front without ocular lines; lateral interspace of elytra impunctate; front claws of male not appreciably enlarged. Ave. length 2.5 mm. *Arizona*; *New Mexico*?; *Texas*.

Head not wider than the thoracic apex, front moderately punctate, spots sharply defined, of medium size. Eyes separated in the male by a distance which is subequal to the length of the first two antennal joints, and barely as great as the vertical width of their upper lobes. Antennae pale basally, outer joints blackish, rather more than three-fourths the length of the body in the male.

Prothorax moderately transverse, widest at about basal third, a little contracted at base, the sides moderately arcuately convergent in front; punctuation close in the darker areas, elsewhere somewhat sparse; side margins smooth, M moderate in extent, quite sharply defined.

Elytra slightly shining but not polished, confusedly but not densely punctured in the scutellar region; striae two to three and seven to eight entire, four

to six more or less broken or confused at middle; shield small; standard spots small.

Pygidium dark brown and yellow, the latter color predominating. Body beneath fuscous with tip of abdomen pale. Legs pale, with small median brownish femoral and tibial spots or shades.

Length 2.5 to 2.6 mm.; width 1.35 to 1.4 mm.

Distribution.—*Arizona*: Santa Rita Mountains, type, male (Snow); Chiricahua Mountains, July 1 (Hubbard & Schwarz); Williams, July 1 (Barber & Schwarz); "Ari" (Morrison—Nat. Mus. Coll.), (Am. Ent. Soc. Coll.); Miller Cañon, Huachuca Mountains, July 10 to 21 (Wenzel); Oak Creek Cañon, one male, Snow Coll., doubtfully referred. *New Mexico*: Socorro, Aug. 1894 (Snow), one male doubtfully referred; Near Las Vegas Hot Springs (Snow), one male doubtfully referred. *Texas*: Chisos Mountains, July 16 (Wenzel).

In a second male from the type locality and evidently specifically identical with the type, the eyes are perceptibly more distant, being separated by slightly more than the vertical width of their upper lobes. It is because of this variation that I have placed here the doubtfully referred specimens above mentioned. In all of these the eyes are nearly as in the second Santa Rita male. In the Socorro and Oak Creek examples the elytral markings are more heavy than in the type, while in the Las Vegas Hot Springs one they are almost wanting. These doubtful specimens vary from the type in the direction of *nogalicus*, of which I have a very homogeneous series collected at Nogales, Arizona, by Mr. Nunenmacher. These latter differ by the eyes being still a little more widely separated, the markings heavier than in typical *precarius*, the sides of the prothorax a little more strongly rounded, and the point of maximum width seems in most specimens to be farther from the base. The two species are certainly closely allied and further collecting may fill the gap between them.

113. *Pachybrachys nogalicus* new species

Pale yellow with rather sharply defined black markings; prothoracic M broad, elytral spots small to moderate; eyes rather distant, front without ocular lines, front claws of male not enlarged. Ave. length 2.7 mm. Arizona.

Head as wide as the thoracic apex, front closely punctate, markings broad. Eyes (σ^7) separated by twice the length of the basal antennal joint or slightly more, in the female by about three times the length of the basal joint. Antennae about three-fourths as long as the body in the male, outer joints blackish.

Prothorax moderately transverse, not much narrowed in front, sides rather strongly rounded, widest but little behind the middle, M heavily marked, extending from base to apex, punctuation close in the darker areas, elsewhere sparse, sides smoother.

Elytral punctuation confused in scutellar region, striate at sides and rear, striae five to six more or less confused medially, shield small and inconspicuous, marginal interspace without punctures, standard spots all evident as a rule, the anterior one of the inner series sometimes obsolete.

Pyggidium black with the typical yellow spots. Body beneath, except abdominal apex, blackish. Femora blackish brown in basal two-thirds, a little paler at extreme base, yellow in apical one-third; tibiae pale, with more or less evident median darker shade.

Length 2.35 to 3 mm.; width 1.3 to 1.6 mm.

Distribution.—*Arizona*: Nogales, Aug. and Sept. (Numenmacher), type, male; Williams, June 30 to July 28 (Barber & Schwarz); July 19 (Wickham).

This species is closely allied to *precarius*, which see for a statement of differences.

114. **Pachybrachys croftus** Bowditch

Black and yellow, variegated, the black prone to predominate; integuments usually minutely alutaceous but with the elytra at least somewhat shining, sometimes strongly so; frontal marks heavy, thoracic M broad, leaving two elongate basal spots, a narrow side margin, sometimes broader in front, and usually a narrow median anterior line, yellow; elytral spots sometimes fairly distinct, but usually—especially the inner series—much suffused, those at the rear transversely confluent. Eyes rather widely separated, front without ocular lines, front claws of male scarcely larger than the others. Ave. length 3 mm. Colorado to Arizona.

Head densely punctate except in the usually small pale areas. Eyes separated by one and two-thirds to one and three-fourths times the length of the basal joint of the antennae in the male, and by twice the length of the basal joint or slightly more in the female. Antennae fully three-fourths the length of the body in the male, the tenth joint three times as long as wide, outer joints blackish as usual.

Prothorax widest and broadly subangulate at about the basal two-fifths, moderately narrowed in front, feebly sinuate before the basal angles, densely punctate, side margins narrowly smooth, black markings always heavy.

Elytra broadly confusedly punctate in baso-sutural triangle, striae variable, moderately impressed, the two outer ones entire, the others evident on the rear convexity and often with one or two at the middle of the disk fairly well defined throughout; marginal interspace impunctate behind the middle; shield wanting.

Pygidium entirely black or with two small elongate apical yellow spots. Body beneath black, the last ventral sometimes in part yellow. Legs yellow with broad black femoral rings and with the tibiae more or less blackish beyond the middle.

Length 2.75 to 3.4 mm.; width 1.45 to 1.85 mm.

Distribution.—*New Mexico*: Clonderoft (type), specimens before me from type locality collected by Wickham, Knaus and Viereck—June and July; Beulah, Aug. 17 (Skinner in Am. Ent. Soc. Coll.); Las Vegas Hot Springs, Aug. 2 (Barber & Schwarz), (Snow). *Colorado*: (Liebeck Coll.); Colorado Springs (Wickham); "Col" (J. B. Smith—Nat. Mus. Coll.), (Snow); Pike's Peak, 7,000–10,000 feet (Wickham), two female examples doubtfully referred. *Arizona*: Bright Angel, July 10 (Barber & Schwarz).

This species is very similar to and cannot be separated superficially from *melanostictus*, but attention to the ocular lines, and front claws of the male, will enable the student to distinguish them without difficulty.

115. ***Pachybrachys sonorensis*** Jacoby

Dull yellow, prothorax suffused with a darker rufous tint, alutaceous and opaque, thickly brown to blackish punctate, the standard spots as a rule more or less evident throughout, rather small and not much confluent on the elytra, rarely completely suffused and almost entirely black. Eyes separated by nearly twice the length of the basal antennal joint in the male, and by fully three times the length of this joint in the female; front without ocular lines; elytra confusedly punctured almost throughout; front claws of male only very slightly larger than the others. *Ave. length* 3.6 mm. *Arizona* to western *Texas*.

Head rather finely unevenly punctate, frontal and vertex spots moderate to heavy. Antennae two-thirds as long as the body in the male, with the tenth joint about three times as long as wide; scarcely more than one-half the length of the body in the female, the tenth joint not much more than twice as long as wide, the basal joint unusually small in both sexes.

Prothorax rather strongly transverse, widest at about basal two-fifths in the male or basal one-fourth in the female, sides nearly straight and moderately convergent in front, sinuate before the hind angles, the punctuation rather fine, close in the dark areas, side margins smooth, thoracic M moderate to heavy, more commonly not attaining the front margin.

Elytra confusedly punctured, the eighth stria alone entire, the seventh sometimes traceable in part, punctures of the eighth stria often more or less double or irregular, the lateral interspace with some punctures basally; shield wanting.

Pygidium black, with two oblique apical yellow spots. Body beneath black, last ventral with or without yellow spots. Legs rufo-testaceous, femora with black rings, tibiae with blackish diffuse shades.

Length 3.2 to 4 mm.; width 1.65 to 2.2 mm.

Distribution.—*Arizona*: Santa Rita Mountains, 5,000–8,000 feet, July (Snow); June 18 (Hubbard & Schwarz); Huachuca Mountains, July 1 to 17 (Wenzel), July (Beyer); Chiricahua Mountains, May 10, June 8 (Hubbard & Schwarz); Ft. Grant, July 19 (Hubbard & Schwarz); Williams, Flagstaff and Bright Angel, July 1 to 20 (Barber & Schwarz); Oak Creek Cañon, 6,000 feet (Snow); Pinal Mountains (Wickham). *New Mexico*: Clouderoft, two females, one with broadly suffused markings, the other almost entirely black. *Texas*: Green Valley, Chisos Mountains, Brewster County, July 15 (Wenzel).

This species is larger than its immediate relatives, and rather easily separable by its almost completely confused punctuation without trace of impressed striae except the lateral one. There are in most examples short, slightly raised elytral costae extending back from the basal margin.

116. ***Pachybrachys varicolor*** Suffrian

Size large, integuments polished; yellow, thickly irrorate with pale brown to black, punctures confusedly distributed almost throughout, maculation varying from almost wanting, through well defined standard spots, to black variegated with small yellow spots and with the margins narrowly yellow; legs yellow; front without ocular lines; front claws of male not appreciably larger. Ave. length 4.25 mm. Colorado to Arizona.

Head not at all wider than the thoracic apex, yellow with moderate to heavy brown to black standard marks. Eyes separated by one and three-fifths to one and three-fourths times the length of the basal antennal joint in the male, and by about twice the length of the basal joint in the female. Antennae rather long and thin in both sexes, blackish at base and tip, tenth joint three and one-half times as long as wide in the male, the joints more nearly filiform in the female, the tenth in consequence nearly four times as long as wide.

Prothorax moderately narrowed in front, sides more strongly rounded posteriorly, slightly incurved at base, punctuation uneven, rather fine, not close, sparser along side margins; M rather diffuse, variable from light to heavy.

Elytra confusedly punctured, with short fragments of unimpressed striae mainly on the convexity, the submarginal stria more or less irregular but entire, the marginal interspace wide and more or less punctate; submarginal interspace narrower and often a little more convex; shield wanting; markings varying from obsolete to heavy, the standard spots sometimes distinct, but more often ill defined or intricately confluent.

Pygidium black, maculate with yellow, more rarely the great part yellow. Body beneath varying from almost completely yellow to black with the terminal ventral segment yellow at apex. In intermediate forms all the ventral segments are yellow in apical half. Legs yellow, terminal joints of tarsi dusky.

Length 3.5 to 5 mm.; width 1.9 to 2.75 mm.

Distribution.—*Colorado*: Veta Pass; Glenwood Springs, July (Fenyés); Leadville 10,000–11,000 feet, July 7 to 14; Salida, July 6 (Wickham); Grand Lake (type of *laevicollis* Bowditch in Bowditch Coll.); "Col" (Leng Coll.). *New Mexico*: Clouderoft, 9,000 feet, Aug. (Knaus); Las Vegas Range, 11,000 feet (Cockerell); Las Vegas Hot Springs, July and Aug. (Snow Coll.), Aug. 2 (Nat. Mus. Coll.); Beulah (Beyer Coll.), (Van Dyke Coll.). *Arizona*: Williams, July (Barber & Schwarz); Huachuca Mountains, 9,000 feet, July 20 (Schaeffer).

The large size, polished surface, generally confused punctuation and yellow legs make this species easily recognizable, although an unusually variable one as regards maculation. This species is undoubtedly the *renidens* of LeConte, but a specimen from Mexico (Ciudad Durango) which is quite surely identical with my most heavily marked example of *renidens* (Las Vegas Range, N. Mex.) is labeled *varicolor* Suffr. by Bowditch, doubtless on the authority of Jacoby, who had seen a Suffrian type. More recently, similar specimens, determined by Jacoby, have been sent me directly from the British Museum by Mr. Gahan.

In our specimens the legs are pretty uniformly yellow but in some Mexican specimens the femora are ringed with blackish—as is stated in Suffrian's description of the species.

Laevicollis Bowd. is nearly typical *renidens* Lec. and therefore *varicolor* Suffr.

117. *Pachybrachys iustrans* LeConte

Black, variegated with bright yellow, the black color usually predominant, integuments polished; eyes separated by fully twice the length of the basal antennal joint in the male; ocular lines wanting, front with more or less evident transverse impression near the upper limit of the eyes; front claws of male not enlarged. Ave. length 4 mm. California.

Head black with small yellow marks, moderately punctate; eyes separated in the male by slightly more than twice the length of the basal antennal joint as a rule, in the female by about three times the length of the basal joint. Antennae thin, in the male fully three-fourths and in the female about two-thirds the length of the body, black, more or less rufous toward the base, especially beneath; tenth joint two and one-half times as long as wide.

Prothorax strongly transverse, especially in the female, feebly to moderately narrowed in front, slightly contracted at base; punctuation rather fine, not very close, side margins nearly smooth. The color may be described as yellow with heavily marked M, or black with the front margin very narrowly, side margin more widely, median line anteriorly and two small basal spots, yellow.

Elytra broadly confusedly punctured in a large baso-sutural triangle, the punctures arranged posteriorly in short more or less irregular scarcely impressed lines, the submarginal stria impressed, leaving the two lateral interspaces more convex; marginal interspace not punctured except about the subhumeral interruption of the eighth stria; shield wanting or small and inconspicuous. The color may be described as yellow with the black standard spots broad, those of the inner series more or less broadly and completely confluent longitudinally, the basal margin, tip, two more or less disintegrated lateral spots and numerous small discal spots, yellow.

Pygidium and body beneath entirely black. Femora black and yellow, tibiae and tarsi black, front tibiae often paler internally.

Length 3.5 to 4.5 mm.; width 1.9 to 2.5 mm.

Distribution.—*California*: San Diego, May; Pasadena, June; Mt. Wilson, July; Placerville, May (Essig); Mokelumne Hill, May (Blaisdell); Dunsmuir (Wickham); Blair's Ranch, Humboldt Co., June 19 (H. S. Barber). Los Angeles Co. (Coquillett), and Santa Clara Co. (Koebele), all in the National Museum Coll. Sobre Vista, Sonoma Co., July, Tuolumne Co., July, Mt. Tamalpais, Marin Co., May 20, Shasta Co., Alameda Co., and Mt. Wilson, Los Angeles Co. (Van Dyke Coll.). *Lower California*: Ensenada (Beyer).

This species varies to almost entirely black, but I have not as yet seen a specimen in which the yellow spots on the head were entirely absent, or the legs entirely black. These black specimens may be distinguished from the black form of *californicus* (var. *gayates*) by the small front claws of the male and the more distant eyes, and generally also by the larger size.

118. ***Pachybrachys californicus*** new species

Black, mottled with bright yellow, the yellow markings generally small and varying from many to few, or even (var. *gayates*) none at all. Surface strongly shining, polished, without alutaceous sculpture or rarely with the faintest trace of it. Eyes (♂) separated by scarcely or barely the vertical width of their upper lobes; front without ocular lines; front claws of male rather strongly enlarged. Ave. length 3.2 mm. California and Arizona.

Head moderately closely punctate, median line impressed between the eyes, yellow with moderate to heavy black markings (or black with yellow markings). Eyes separated in the male by about the length of the basal two joints of the antennae, in the female by about two and one-half times the length of the basal joint. Antennae slender, more than three-fourths the length of the body in the male, the tenth joint three times as long as wide, black with several of the basal joints yellowish, at least on the under side.

Prothorax widest and rather strongly rounded at about the basal third (variable), sides moderately convergent in front and distinctly rounded in posteriorly, with a small but more or less evident sinuation before the hind

angles; punctuation close, only a little uneven, punctures somewhat less close along the side margins when the latter are yellow, scarcely at all so when the margins are black; yellow markings small, variable in number from many to none.

Elytra confusedly punctured in a broad baso-sutural triangle, punctures at sides and rear arranged in more or less impressed sinuous lines, the submarginal stria interrupted behind the humerus; marginal interspace (σ^7) punctured near the base, narrow posteriorly; in the female with more numerous punctures which may be confused with those of the stria; shield varying from rather large, yellow, and distinct, to small and inconspicuous; yellow markings small, many to few, and occupying the usual spaces between the standard black spots, which are here broadly suffused or confluent.

Pygidium and body beneath black, the former rarely with two small apical yellow spots. Femora black and yellow, tibiae blackish.

Length 2.5 to 3.9 mm.; width 1.35 to 2.15 mm.

Distribution.—*California*: Mokelumne Hill (Blaisdell), male type; Siskiyou Co., June 2; Alameda Co., May 30, and Eldorado Co. (Nunnenmacher); Lake Tahoe, July 12 to 17 (Hubbard & Schwarz and my own colls.); Tahoe City, Aug. (Van Dyke); Bartlett Springs, one female, identity doubtful (Fenyess); Santa Cruz Mountains (Horn Coll.); San Diego, May 27 (var. *gagates*). *Arizona*: Pinal Mountains (Wickham); Ash Fork, June 18 (Barber & Schwarz).

Var. ***gagates*** new variety

This name is proposed for a series from San Diego, California, seemingly specifically identical with the type form, but so far as seen, invariably entirely black. One female of the Alameda Co. examples above recorded is entirely black and others are very nearly so; these connect the San Diego specimens perfectly with the more sparsely mottled ones of the typical form, and the present varietal name is therefore only a convenience for tabulating and distinguishing from the other black or nearly black forms of *lustrans*, *melanostictus* and *signatiformis* occurring on the Pacific coast.

Californicus may be distinguished from *lustrans*, which in some forms it most closely resembles, by the more approximate eyes, front not transversely impressed between the eyes, and by the very distinctly enlarged front claws of the male. Certain specimens of *californicus*, especially those from the Pinal Mountains of Arizona, are closely similar to the darker forms of *alticola*, but the latter has more widely separated eyes and may with certainty be distinguished by the small front claws of the male.

119. ***Pachybrachys pinguescens*** new species

Closely allied to *californicus*, differing only as follows: Size larger, a little stouter, prothorax similarly strongly rounded in the male, and distinctly more inflated in the female than in *californicus*, widest nearly at the middle in the female type; front less evidently impressed along the median line; antennae a little more slender, the tenth joint about four times as long as wide in the

male; prothorax more finely and less closely punctate; front claws of male even more strongly enlarged.

Length 3.5 to 4 mm.; width 1.8 to 2.1 mm.

Distribution.—*California*: Independence, June (Fenyos); type female. *Arizona*: Ash Fork, June 18 (Barber & Schwarz), one male.

The type is in great part black, the black frontal marks heavy, the prothorax with a very narrow apical margin, broader nearly smooth side margins, a short thin anterior median line and two small basal spots, yellow; elytra with basal margin, subhumeral lobes, lateral spots and a few discal flecks, yellow. In the Arizona male the yellow markings are larger and the upper surface might best be described as yellow, with the pronotal M heavy, the elytra with standard spots, those of the inner series irregular and subconfluent, legs more yellow than black. In both sexes the pygidium has two confluent apical yellow spots, and the last ventral is largely yellow. In *californicus* the last ventral is entirely black and the pygidium only rarely shows two small widely isolated yellow spots. In the female type the elytral shield is represented by a small yellow dot; in the Arizona male it is much larger and quite conspicuous.

120. *Pachybrachys tridens* Melsheimer

Pale yellow with broad sharply limited black markings; antennae usually, and legs entirely yellow, size small, lustre dull. Eyes separated by about twice the length of the basal antennal joint in the male, and by two and one-half to three times the length of this joint in the female; ocular lines fine; front claws of male not enlarged. Ave. length 2.7 mm. Eastern half of United States.

Head nearly uniformly, not densely punctured, frontal spots usually very much reduced or almost entirely wanting in the male, better developed or even broadly suffused in the female.

Prothorax strongly transverse, slightly narrowed in front with the sides feebly arched in the male, more obviously narrowed and with the sides more rounded in the female; yellow with a subquadrate black spot each side nearer the base than the apex, and a median stripe dilated in front and usually divided anteriorly by a yellow line, the median and lateral marks very rarely connected in front; punctuation rather sparse and somewhat irregular.

Elytral striae lightly impressed laterally, scarcely so on the disk, fairly regular; shield moderate, feebly or scarcely elevated, yellow. The elytra may be described as yellow with a transverse black basal fascia wider at the suture, along which it narrowly joins a still wider posterior fascia. The anterior

fascia may be interrupted within the humeral knob and the posterior band is often more or less deeply emarginate anteriorly. In the more heavily marked specimens the elytra may be defined as black, with the apex and a somewhat oblique ante-median fascia interrupted at suture, yellow; marginal interspace nearly or quite impunctate.

Pygidium black with the usual yellow apical spots. Body beneath black, sides of abdomen and last segment more or less yellow. Legs yellow, the femora sometimes with small faint median clouds.

Length 2.2 to 3.2 mm.; width 1.2 to 1.75 mm.

Distribution.—*Connecticut*: (Leng). *New York*: Staten Island, June and July (Leng); Long Island (Nat. Mus. Coll.); Ft. Lee, June 18 (Van Dyke Coll.); "N. Y." (Am. Ent. Soc. Coll.). *New Jersey*: (Nat. Mus. Coll.); So. Orange, June 8 (Leng); Cairo, July 23 (Leng); West Hebron, June 20 (Leng); Anglesea (Wenzel). *Pennsylvania*: (Horn Coll.), (Liebeck); Frankford (Wenzel); Eberly's Mill (var. *flavicornis*) (Kirk and Champlain). *District of Columbia*: Washington, May 20 to June 25 (Hubbard & Schwarz). *Virginia*: without specific locality. *Michigan*: Detroit, June (Hubbard & Schwarz). *Indiana*: (Liebeck Coll.). *Illinois*: (LeConte Coll.); "S. Ill." May 27 (Soltau in Nat. Mus. Coll.). *Iowa*: Iowa City, May 30 (Wickham). *Missouri*: (LeConte Coll.). *Kentucky*: (Soltau—Nat. Mus. Coll.). *Kansas*: Douglas Co. (Snow). *Texas*: (Nat. Mus. Coll.).

This prettily marked species is rather widely dispersed and quite familiar to most collectors. The ground color in some examples is very pale whitish yellow, contrasting strongly with the black markings; the ocular lines are a little variable in depth but as a rule are quite fine and feebly impressed; the antennae are entirely yellow, a very unusual character.

Var. **flavicornis** Melsheimer

This is *tridens* with the thoracic markings broad and connected so as to leave two basal spots, the side margins and front angles yellow; the elytral fasciae are also heavier than usual, leaving the apex and an obliquely transverse rather narrow yellow fascia not attaining the suture. The interval between this form and the typical *tridens* is not great and is completely occupied by intermediates.

121. **Pachybrachys obsoletus** Suffrian

Very similar to *tridens* in form, size and all other characters except as follows. The thoracic spots are as a rule not quite so regular and sharply outlined, the broad elytral markings of *tridens* are here broken up so as to show the standard spots, which are, however, often more or less connected posteriorly, the sutural interspace almost invariably wholly or in great part pale. The

antennae are sometimes entirely pale as in *tridens*, but more often some of the outer joints are in part dusky, the darker femoral spots or clouds more often present, the elytral striae as a rule slightly more impressed, the punctures a little coarser.

These differences are all rather trifling and I have been strongly inclined to place the present form as a variety of *tridens*; there, however, does not seem to be any definite evidence of this connection, and as the vast majority of specimens are sharply separable by color characters, and are held to be distinct in nearly all collections I have examined, it is perhaps wisest to so consider them for the present. It is very easy to imagine the broad fasciae of *tridens* the result of the enlargement and confluence of the usual elytral spots, and indeed the humeral spot is frequently isolated by the interruption of the basal fascia, and the middle marginal spot is also often fairly well defined by a narrowing or an emargination of the posterior fascia, but never seems to lose its connection with the adjacent spots. In one or two of the many specimens of *obsoletus* before me the elytral spots are so far connected as to approach very closely the adjacent extremes of the *tridens* form, but even in these there is lacking something of that sharpness of outline so characteristic of the latter. Normally, and indeed almost without exception in *obsoletus* the sutural interspace of the elytra—so far as it is clearly defined—is wholly or largely yellow, thus interrupting the posterior fascia. In *tridens* this fascia is not interrupted and the suture is entirely black from the base to the apical yellow blotch. Here as in *tridens* the width of the front between the eyes and the distinctness of the ocular lines is somewhat variable. In a considerable number of specimens, for the most part females from west of the Mississippi, the maculation is not black but varies from fuscous to pale brown.

This species has been identified by Bowditch as *peccans* Suffr., but incorrectly so. The two species are very easily separable if males are at hand, the front claws being very distinctly enlarged in *peccans*, while in the present species they are scarcely at all larger than those of the middle and hind feet; some females, however, are not so easy to distinguish.

Neither Mr. Bowditch nor myself has been able to obtain a type of *obsoletus* for examination, and it is by no means certain that my own interpretation of the species is correct; there is, however, a fair probability of it, and pending definite information it seems better to use this name than to coin a new one. The range of the species is wider than that of *tridens* as is shown by the following.

Distribution.—*New Hampshire*: Farmington, Aug. 3; Webster (Fiske); Franconia (Mrs. A. T. Slosson). *Massachusetts*: Tyngsboro, Aug. 10, and Tewksbury, July 24 (Blanchard); Marion, Aug. 9 to 12. *New York*: Vicinity of New York City (Leng); Cold Spring, July (Sherman); Buffalo (Am. Ent. Soc. Coll.); Bluff Point (Casey). *New Jersey*: Clementon, Aug. 10, and Anglesea, May 30 (Wenzel). *Pennsylvania*: Pocono Lake, July and Aug. (Wenzel). *Virginia*: (Leng); Pennington Gap (Hubbard & Schwarz). *South Carolina*: (Wenzel Coll.). *Georgia*: Tybee Island, June 24 (Wenzel). *Florida*: (Liebeck), identity a little doubtful, male lacking. *Michigan*: Sault Ste. Marie, July 14 (Nat. Mus. Coll.); Detroit (Hubbard & Schwarz). *Ohio*: Cincinnati (Dury). *Indiana*: (Liebeck Coll.). *Wisconsin*: Bayfield (Wickham). *Iowa*: (Wenzel Coll.); Riverton; Elmira, June 25; Nebraska City (Elliott), and Eddyville (Wickham Coll.). *Missouri*: "Mo." and "C. Mo.," June, on locust (Riley—Nat. Mus. Coll.). *Nebraska*: Sand Hills, July (Nat. Mus. Coll.); West Point (Nat. Mus. Coll.). *Kansas*: Salina (Knaus); Rawlins Co. 2,850 feet (F. X. Williams); Douglas Co. (Snow); Imperial (Blaisdell Coll.). *Dakota*: Bismarck (Wickham). *New Mexico*: Magdalena Mountains (Snow), identity not quite certain. *British Columbia*: Selkirk Mountains (J. Chester Bradley) one ♀, identity not certain.

122. ***Pachybrachys alticola*** new species

Very similar to *laevis*, size a little larger, integuments polished, or more rarely less shining but without any clearly defined alutaceous sculpture; yellow with black standard spots variably developed, often broadly suffused and involving the greater portion of the pronotal and elytral disks; eyes slightly more widely distant than in *laevis*, front with rather feebly impressed ocular lines; front claws of male not appreciably enlarged. Ave. length 3 mm. Colorado and New Mexico.

Head nearly as in *laevis*, front mostly yellow with broad vertex spot, median spot linear; spots may be larger in female. Eyes separated by a distance which in the ♂ varies from slightly less to slightly more than twice the length of the basal antennal joint, and in the female is about two and one-half or two and three-fourths times the length of the basal joint.

Prothorax rather finely and not closely punctured, M variable, black, sharply defined, more or less broken in the paler forms in which the color may be best described as black with three discal spots or lines and the side margins yellow.

Elytra with confused punctures baso-saturally, striae elsewhere more or less clearly marked, feebly impressed, four and five confused in front of the middle, eight a little more impressed, marginal interspace not punctate; shield small. The maculation is variable, the standard spots defined in the typical form, except that the middle inner spot is confluent with the posterior one and more or less so with the corresponding outer one. In the darker forms the spots are broadly suffused, leaving the elytra black, with basal edge, post-humeral lateral spot, apex and some smaller dots in the sutural region, yellow; in these darker individuals the shield is not defined. All else nearly as in *laevis*.

Length 2.75 to 3.35 mm; width 1.4 to 1.8 mm.

Distribution.—*New Mexico*: Beulah, July (type ♂); Clonderoft 9,000 feet June 9–14, also August (Knaus); S. Fork Eagle Creek, 8,000 feet, White Mountains, Aug. 18 (Townsend); Socorro Co., Aug.; Magdalena Mountains, Aug.; near Las Vegas Hot Springs, 7,000 feet, Aug. (all from Snow Coll.); Beulah (Beyer), July 24 (Cockerell). *Colorado*: Colorado Springs, 6,000 to 7,000 feet, June (Wickham); Garland, June 18 to 25 (Hubbard & Schwarz); Cañon City, May 14 (Soltan—Nat. Mus. Coll.).

123. *Pachybrachys laevis* Bowditch

Small, yellow, standard spots variable from black or nearly so through pale brown, diffuse and indistinct to entirely wanting; integuments polished, shield large, elongate, nearly or quite one-third the length of the elytra; eyes (♂) separated by scarcely twice, and in the female by somewhat more than twice the length of the basal joint of the antennae; front without ocular lines; front claws of male not appreciably enlarged. Ave. length 2.5 mm. Texas, Colorado and New Mexico to California (?).

Head slightly wider than the thoracic apex, rather sparsely punctured, vertex spot broad, black, median spot linear to narrowly triangular, front predominantly yellow as a rule. Eyes in male distinctly more widely separated than the vertical width of their upper lobes. Antennae blackish except basally, fully three-fourths as long as the body in the male, not much more than half as long as the body in the female, the tenth joint about two and one-half times as long as wide in both sexes.

Prothorax moderately strongly transverse, sides slightly convergent and nearly straight from the base or very near it, punctuation moderately coarse, not close, a little uneven in distribution, side margins smooth, M variable from rather broad and complete to faint and fragmentary, often with the three basal spots only well defined.

Elytral striae fairly regular, a little impressed, four and five often somewhat broken and confused at middle, eighth only feebly sinuous, marginal interspace impunctate; standard spots fairly distinct, the middle one of the inner series often confluent more or less with the corresponding outer spot and with the posterior inner one; shield large, elongate, feebly convex, yellow.

Pygidium with typical marks, yellow predominating. Body beneath blackish, apex and sometimes the sides of the venter more or less yellow. Legs entirely yellow, the tips of the four posterior femora paler, or all the femora may have dark spots or rings, and the tibiae corresponding dark shades beyond the middle.

Length 2.25 to 2.8 mm.; width 1.2 to 1.45 mm.

Distribution.—*Colorado*: Colorado Springs, 6,000 to 7,000 feet, July 20 to 26 (Wickham), cotype from Bowditch; Golden, Mount Lookout, 7,700 feet, June 26 (Frost); Buena Vista, July 4 (Hubbard & Schwarz). *Texas*: Chisos Mountains, July 23 (Wenzel). *New Mexico*: Coolidge (Wickham); Las Cruces, May 15 (Townsend); La Luz Cañon, April 18 (A. N. S. P.); Bernalillo Co. (Leng Coll.). *Arizona*: Winslow (Leng. Coll.); Williams, June 30 (Barber & Schwarz); "Ariz" (Wickham). *Utah*: Milford, July 7 (Wickham). *Nevada*: Reno (Wickham). *California*: Los Angeles Co. (Coquillett—Nat. Mus. Coll.), identity doubtful.

This small species, at least in its typical form, is rather easily recognized by the tabular and diagnostic characters, although in a general way very similar to a number of others—notably *alticola*, *obsoletus*, *nubilus* and *mercurialis*. The Nevada and Utah specimens look somewhat different, but as all the specimens before me are females and show no definite distinctive characters they would best remain here for the present. The Los Angeles County, California, specimens—two males—look almost exactly like typical *laevis*, but in one of them the eyes are much too distant and the front is less shining. It may represent a distinct species, and may possibly be a variety of *mercurialis*, which species closely resembles the immaculate forms of *laevis*, but differs by its more widely separated eyes. The resemblance of my Colorado cotype of *laevis* to St. George, Utah, specimens of *nubilus* is very close, the latter apparently differing only by the appreciably less distant eyes.

124. *Pachybrachys nubilus* Bowditch

Pale yellow, standard spots small, pale brown, sometimes darker and better defined, sometimes nearly or quite wanting; antennae very slender, nearly as long as the body in the male, tenth joint about four times as long as wide; eyes separated in the male by a distance scarcely or barely as great as the vertical width of their upper lobes; front without ocular lines; front claws of male not enlarged. Ave. length 2.9 mm. Arizona: Utah.

Head rather sparsely punctate, spots almost wanting, median line finely impressed; eyes separated in the male by about one and two-fifths times the length of the basal antennal joint or by about the length of the first two joints.

Prothorax moderately transverse, sides nearly straight and a little convergent from near the base to apex; punctuation uneven, side margins smooth, spots small and vague.

Elytra with confused punctuation in a moderate baso-sutural triangle; striae feebly or scarcely impressed, three, four, seven and eight fairly regular and entire, five and six much confused; shield triangular, distinct, of moderate size; marginal interspace impunctate; eighth stria with a strong sigmoid dislocation near the base.

Pygidium typically marked with black and yellow. Body beneath black, last ventral in part yellow. Legs pale yellow with small median femoral and tibial darker spots or clouds.

Length 2.7 to 3.1 mm.; width 1.35 to 1.5 mm.

Distribution.—*Arizona*: Bill Williams Fork (Snow), type. *Utah*: St. George, July (Wickham).

The above description is drawn from a male from the type locality. In it the eyes are slightly more approximate than they are in the actual type, which I have examined, but the difference is probably purely an individual one. In the single St. George, Utah, specimen before me—a male—the spots are blacker and more distinctly defined than in the typical form, rather strongly resembling some specimens of *laevis*. A single female example in my own collection taken by Snow in Arizona (exact locality not indicated) is almost certainly identical with the Utah male, differing only in its fainter maculation, and as might be expected in its more robust form. As compared with *laevis* the present species is rather larger, with less distant eyes, longer antennae, the tenth joint four times as long as wide (less than three times as long as wide in *laevis*), the elytral shield less prolonged.

125. ***Pachybrachys conspirator*** new species

I have separated under this name four examples sent me by Mr. Chas. Schaeffer which agree so closely in almost all respects with the nearly immaculate forms of *nubilus* as to require no separate description. The males have the same narrow cylindrical form and very slender antennae nearly as long as the entire body; the standard spots are small and faint on the pronotum, entirely absent or in part very faintly indicated on the elytra; the elytral striae are more broken and irregular than in *nubilus*, the marginal interspace with a few punctures—more numerous in the female—and the eyes are separated by fully one and three-fourths times

the length of the basal antennal joint in the male, and by but little less than three times the length of the basal joint in the female.

Distribution.—*Arizona*: Without more definite locality—(Schaeffer), type ♂. Also an example in the Nat. Mus. Coll. (Linell).

It is not absolutely certain that the single female is properly associated with the three males sent; the latter are therefore to be considered typical. It is not at all unlikely that this is only an extreme form of *nubilus*.

126. ***Pachybrachys subvittatus*** LeConte

Robust, shining, yellow, prothorax with a median anteriorly divided black vitta, and a broader more diffuse brown or brown and black sublateral vitta each side; elytra with the sutural and lateral edge and small standard spots black, the outer series submarginal and distinct, the inner spots narrow or linear and forming a dislocated interrupted disco-sutural vitta. Eyes moderately distant; front without ocular lines; front claws of male only slightly enlarged. Length 3.6 mm. Texas.

Head with the typical black markings well developed, pale areas nearly smooth, dark areas closely punctured; eyes separated in the male by twice the length of the basal antennal joint. Antennae moderate, scarcely three-fourths the length of the body in the male, the tenth joint three times as long as wide or slightly less.

Prothorax strongly transverse, widest at or a little in front of the basal third, where the sides are rather strongly rounded; moderately narrowed in front and rounded in at base; punctuation fairly close in the dark areas, rather sparse elsewhere, smooth between the forks of the median vitta; side margins narrowly smooth.

Elytral punctures black, confused in a small sutural triangle, striae elsewhere more or less sinuous but subentire, lightly impressed on the disk, more evidently so laterally, eighth stria with subbasal dislocation, marginal interspace impunctate, shield not evident.

Pygidium black, with or without apical yellow spots. Body beneath black. Legs rufo-testaceous, the tarsi and apical parts of the tibiae dusky.

Length 3.6 mm.; width 2 mm.

Distribution.—*Texas*. The type series in the LeConte Collection consists of four males, probably collected by Belgrave. The species is also represented in the Nat. Mus. (Belgrave), Horn, Am. Ent. Soc. and Leng Collections, but by very few examples, and all labeled simply "Tex" except one specimen in the Leng Coll. which is marked "Blowout."

127. **Pachybrachys liebecki** new species

Pale yellowish testaceous, elytra with slight greenish tint; prothorax with very diffuse reddish brown clouds, frontal markings not large, reddish brown; surface finely alutaceous, scarcely shining. Ave. length 3.75 mm. Kansas.

Head moderately punctate, ocular lines distinct; eyes rather small, not prominent, separated in the male by a little less, and in the female by a little more than their own vertical lengths, or by about two and one-half or two and three-fourths times the length of the basal antennal joint in the male and about four times the length of the basal joint in the female. Antennae short, scarcely exceeding half the length of the body in the male, and distinctly shorter in the female, the subapical joints twice as long as wide, color rufous, basal joints darker above, beyond the middle entirely blackish.

Prothorax transverse trapezoidal, the sides nearly straight, very broadly obtusely subangulate just before the base; punctuation not very dense, nearly evenly distributed, side margins smoother but not abruptly so.

Elytra much wider than the prothorax, punctuation fine, striae seven and eight and usually one and two or two and three fairly regular but unimpressed, the punctures of the intermediate area and in the scutellar region confused; submarginal interspace convex and prominent, marginal interspace flat and impunctate except near the base; elytral shield wanting, lobe without marginal row of punctures.

Pygidium entirely pale. Body beneath pale, the metasternum black at middle. Legs flavo- or rufo-testaceous, thighs with or without slightly darker diffuse median clouds. Front claws of male not enlarged.

Length 3.5 to 4 mm.; width 1.8 to 2.15 mm.

Distribution.—*Kansas*. The type is a male from "Ks" given me by Mr. Liebeck, to whom it is a pleasure to dedicate the species. Other examples before me are from Hamilton Co. and Clark Co. (Snow); Medora, May (Knaus).

The size, color, and convex submarginal (eighth) interspace make this species easily recognizable. The general facies strongly suggests the paler forms of the *bivittatus* group, with which it seems best to associate it, but it should be remarked that in all the other species of this group the ocular lines are indistinct or wanting, the elytra as a rule vittate, and the elytral lobe shows the usual marginal series of punctures.

128. **Pachybrachys bivittatus** Say

Yellow, prothoracic disk usually broadly suffused with rufous, elytra each with a median black or brown vitta and three lateral spots one or more of which may be lacking. Eyes in the male separated by less than twice the length of the basal joint of the antennae, ocular lines subcontiguous to the eyes, front claws of

male not appreciably enlarged. Ave. length 4.5 mm. Inhabits the greater part of the United States.

Head barely as wide as the thoracic apex, densely or closely punctate in the frontal impression and dark areas, elsewhere more sparsely so; markings very variable in extent and depth of color; eyes separated by one and three-fourths (more or less) times the length of the basal antennal joint in the male, and by about two and one-half times the length of the basal point in the female, the distance in the latter sex being always somewhat less than the vertical length of the eye. Antennae reaching the middle of the elytra in the male, shorter in the female, black beyond the middle, tenth joint barely or scarcely three times as long as wide.

Prothorax subconical in the male, the sides feebly arcuate, a little more rounded behind in the female; punctuation line and not very close, side margins narrowly smooth or nearly so; M rarely defined, the entire disk usually suffused with rufous or brownish, leaving the side margins and not infrequently a narrow anterior median line pale.

Elytra confusedly punctate in baso-sutural region, striae not or scarcely impressed, submarginal distinct, the others less so; marginal interspace wide, and impunctate except near the base; shield wanting. The elytra may be described as bivittate with the outer vitta rarely if ever entire, usually interrupted to form three spots, of which the median one is often small or wanting and that on the humeral knob less often absent; the sutural bead and the greater part of the lateral edge back of the lobe are black in fully colored examples.

Pygidium yellow with base blackish. Body beneath brown to black, with apex and sometimes sides of abdomen pale. Legs rufo-testaceous, the tarsi becoming darker.

Length 3.9 to 5 mm.; width 1.8 to 2.7 mm.

Distribution.—*New Hampshire*: (Fenyess); Hudson (Blanchard); Franconia (Mrs. A. T. Slosson). *New York*: (Nat. Mus. Coll.). *Pennsylvania*: (Wenzel). *Maryland*: Glymont, May 25; Pope Creek, May 22 (both collected by Griffith—Liebeck Coll.). *Virginia*: (Nat. Mus. Coll.), (Beyer Coll.). *Ohio*: Cincinnati, June 29 (Dury). *Indiana*: (Soltau—in Nat. Mus. Coll.); Wells Co., July 14 (Liebeck Coll.). *Illinois*: Algonquin, June 19, July 7 (Nason); Bloomington, June 8 (Wickham Coll.); "C. Ill." (Nat. Mus. Coll.). *Wisconsin*: (Leng Coll.). *North Dakota*: Fargo (Soltau—Nat. Mus. Coll.); Williston (Wickham). *South Dakota*: Volga (Truman—Wickham Coll.). *Nebraska*: Sand Hills (Bruner—Nat. Mus. Coll.). *Kansas*: Douglas Co. and Hamilton Co. (Snow); McPherson, Benedict and "So. Kans" (Knaus). *Texas*: (Nat. Mus. Coll.); Austin, June 28 (Soltau—Nat. Mus. Coll.); New Braunfels (Liebeck Coll.); Round Mountain, and Davis Mountains, July 7 (Wenzel). *Montana*: (Leng Coll.). *Colorado*: Colorado Springs, June 15 to 30 (Wickham); Cañon City (Wickham); Denver, July 7 (Hubbard & Schwarz); "Col" (various collections). *New Mexico*: Silver City (Dury); Pecos, June 17 (Cockerell). *Arizona*: Grand Cañon of Colorado, July 13 (Barber & Schwarz); Cosumio Cañon (Horn Coll.); Winslow (Leng Coll.); San Bernardino Ranch, Cochise Co. (Snow); Chiricahua Mountains, May 30 to June 8 (Clemence); Prescott

(Van Dyke); "Ari." (Nat. Mus. Coll.). *Utah*: Ogden, June 21, and Am. Fork, June 24 (Hubbard & Schwarz); "Ut." (Liebeck Coll.). *Oregon*: Huntington (Hubbard & Schwarz, and Leng Colls.). *California*: Pomona, April 23 to 30; San Diego (Blaisdell); Havilah, May 30 (Pilate); Los Angeles (Leng Coll.); Los Angeles Co. (Coquillett—Nat. Mus. Coll.). *Lower California*: San Felipe (Beyer).

One of our commonest and most widespread species. Bowditch⁶ has called attention to the fact that the name *viduatus* has long been wrongly used for this species.

129. **Pachybrachys sublimatus** new species

In size, form, sculpture and structure closely related to *bivittatus* and allies; the form is almost exactly that of *bivittatus*, the lustre somewhat dull, cephalic markings black, the frontal triangle often very narrowly attaining the vertex spot and frequently failing to reach the antennal foveae.

Prothorax rather more densely punctate than in *bivittatus*, the side margins less distinctly smooth, disk with very vague and diffuse reddish brown shades representing the M, the lateral branches usually more pronounced.

Elytra sometimes with a single narrow black vitta, with or without traces of lateral spots, but usually without markings, the sutural bead and portion of lateral edge black, precisely as in *bivittatus*; submarginal stria much confused, the marginal series of punctures more or less irregular, in which respect the present species is more nearly in agreement with *consimilis*. The eyes are separated in the male by two to two and one-half, and in the female by about three times the length of the basal antennal joint. Legs—except last one or two tarsal joints—entirely pale.

Length 3.8 to 4.35 mm.; width 1.8 to 2.3 mm.

Distribution.—*California*: San Bernardino Mountains, July 12, types ♂ and ♀; Pasadena, July 19; Claremont (Baker).

130. **Pachybrachys circumcinctus** Crotch

Closely allied and generally similar to *bivittatus*, differing as follows. The size is on the average a little smaller, surface more shining, the alutaceous sculpture often nearly lacking (normally quite distinct in *bivittatus*), elytra each with a single broad black vitta, the lateral edge and epipleuron black around the lobe nearly to base; prothorax rufous or rufo-testaceous with side margins paler and often with three small more or less distinct darker to blackish basal spots; eyes separated in the male by about two and one-half and in the female by rather more than three times the length of the basal joint of the antennae, the distance in the female, however, not quite as great as the vertical length of the eye; the two outer series of elytral punctures less regular than in *bivittatus*; body beneath black, the apex of the last ventral, on each side of the middle, pale, the sides of the body usually not pale; tibiae sometimes in part blackish, the tarsi more evidently so than in *bivittatus*.

Length 3.7 to 4.2 mm.; width 2.1 to 2.4 mm.

⁶Ent. News, 1908, p. 217.

Distribution.—*California*: Dunsmuir (Wickham); Shasta Co. (Nat. Mus. Coll.), (Van Dyke Coll.); Siskiyou Co. (Van Dyke); Cole, July, and Castle Crag, July (Fenyès); Del Norte Co., June 1, and Siskiyou Co., July 2 (Nunnenmacher); Tuolumne Co., July (Van Dyke); San Jose (Hubbard & Schwarz); Santa Clara Co. (Coquillett in Nat. Mus. Coll.); Yreka (Leng Coll.); (Snow Coll.). *Oregon*: Hood River, May 19 (Hubbard & Schwarz); Josephine Co., June 8 (Nunnenmacher).

131. ***Pachybrachys consimilis*** new species

Extremely close to *circumcinctus*, and possibly a geographical race of that species. It differs chiefly in its very distant eyes, which in the male are separated by about three times, and in the female by four times the length of the basal antennal joint, the distance in the latter sex being actually greater than the vertical length of the eye. The elytral vitta is even broader than in most examples of *circumcinctus*, the lateral edge is black around the apex to the suture and the two outer elytral series of punctures are more irregular or confused. Size slightly larger and form more robust than in *circumcinctus*.

Distribution.—The type is a female collected by Dr. Fenyès at Sugar Pine, near the entrance to Yosemite Valley, California. Other examples are from Tuolumne Co., July (Van Dyke); Eldorado Co., June 9 (Nunnenmacher), and Mokelumne Hill, May 19 (Blaisdell)—all in California.

132. ***Pachybrachys litigiousus*** Suffrian

Above yellow, cephalic markings and pronotal M moderate to heavy, black and sharply outlined, elytra with suture, two discal vittae and extreme lateral edge black. Eyes very distant, front without ocular lines; front claws of male not enlarged.

Head finely sparsely punctate, more coarsely and closely so in the triangular black frontal spot; eyes distant from somewhat less to rather more than three times the length of the basal antennal joint. Antennae not very slender, about two-thirds as long as the body in the male, blackish in great part, tenth joint less than three times as long as wide.

Prothorax less strongly transverse than usual, not or but slightly dilated posteriorly, sides feebly arcuate and moderately convergent from base to apex; punctuation sparse, the punctures separated by two to three times their own diameters, not much closer laterally; side margins smooth; markings broad, the black color predominating, leaving two elongate oval oblique basal spots, an anterior median line, the front margin narrowly, and side margins more widely, yellow.

Elytral striae nearly regular throughout, feebly impressed discally, a little deeper at sides, a few irregular punctures along the suture near the base; shield wanting; sutural vitta subequal in width to the discal ones, the latter as a rule slightly wider than the intervening yellow stripes; lateral stria without sub-basal dislocation, lateral interspace impunctate.

Pyggidium at base, and body beneath black, the last ventral segment in part yellow. Legs rufo-testaceous, the apical portions of the femora and base of tibiae whitish yellow.

Length 2.9 to 4 mm.; width 1.6 to 2.4 mm.

Distribution.—*New Jersey*: (Liebeck); Da Costa, July 1, and Anglesca (Wenzel). *District of Columbia*: (Wenzel). *North Carolina*: Wilmington (Wenzel). *Georgia*: (Horn Coll.). *Florida*: Haulover, March; Capron, April 3; Crescent City (all in Hubbard and Schwarz Coll.); Jacksonville (Liebeck Coll.); Key West (Leng Coll.); Tampa (Van Duzee in Wickham Coll.).

The head and pronotum are typically very finely alutaceous and feebly shining, the elytra more or less distinctly minutely transversely wrinkled, but in one female example from Alpine, Texas, doubtfully referred, the upper surface is quite strongly shining, with traces, however, of the fine sculpture.

133. *Pachybrachys virgatus* LeConte

Rather large, yellow, prothorax with three entire black, or more often black and brown, stripes, the middle one dilated anteriorly; elytra with the suture, two discal stripes and the marginal bead black; integuments polished. Eyes widely distant, separated even in the male by rather more than their own vertical length; front without ocular lines; front claws of male not enlarged. Ave. length 4 mm. Nebraska to Texas and Colorado.

Head rather coarsely, nearly uniformly punctate, a broad vertical plaga and a small but broad inter-ocular spot, feebly or scarcely connected with the former, black. Eyes in the male separated by fully two and one-half times the length of the basal antennal joint, in the female by more than three times the length of the basal joint. Antennae not very slender, in great part black, tenth joint (σ^7) three times as long as wide.

Prothorax rather long, broadly arcuately narrowed from near the base, scarcely dilated posteriorly, rather coarsely punctate, the punctures separated by their own diameters medially, somewhat closer toward the sides, the side margin narrowly smooth; lateral vittae of nearly uniform width, usually brown, more or less overlaid with black, median vitta a little dilated in anterior half and usually with a trace of a paler median line in the dilated portion.

Elytra strongly shining, nearly regularly striate, the outer striae quite distinctly, the inner ones lightly impressed, punctures of the short scutellar striae more or less confused, eighth stria without post-humeral interruption, interspaces not or but very feebly and finely transversely wrinkled; shield wanting; sutural vitta a little narrower than the discal ones, the latter subequal in width to each other and to the intervening yellow stripes, outer vitta occupying the seventh and eighth interspaces basally, gradually changing posteriorly to the sixth and seventh.

Pygidium black in basal half, apex yellow. Body beneath black, last ventral with pale apical margin. Legs entirely rufo-testaceous.

Length 3.7 to 4.4 mm.; width 1.9 to 2.4 mm.

Distribution.—*Nebraska*: (type); Lincoln, June (Nat. Mus. Coll.). *Kansas*: (Le Conte Coll.); Douglas Co., 900 feet (Snow); Salina (Knaus). Hamilton Co. (Snow). *Texas*: (Blanchard Coll.), (Liebeck Coll.). *Colorado*: Colorado Springs, June (Wickham).

This is a somewhat scarce species of which I have seen altogether but ten examples. It is easily separable from all others in our fauna except the next (*dubiosus*), which see for comparative notes.

134. *Pachybrachys dubiosus* LeConte

Very closely allied to *virgatus*. The type is a female from Texas 3.1 mm. long, as compared with 4.1 mm. for the type of *virgatus*. The median thoracic stripe is here rather widely bifurcate in front, but does not joint the lateral stripes. In *virgatus* the median stripe is more abruptly but not greatly dilated at middle, the anterior part not evidently bifurcate, but with subparallel sides, the median line of the dilated portion often narrowly and obscurely paler. The surface is nearly as perfectly smooth and shining as in *virgatus*, there being at most but the faintest evidence of alutaceous sculpture; the sides of the prothorax are a little dilated behind (scarcely so in *virgatus*) and this is quite conspicuous in a second example—a male from Texas—subsequently associated with the female type. This male specimen is closely similar to the type in lustre and sculpture and is probably identical but this cannot be asserted with certainty. In it the eyes are separated by scarcely if any more than twice the length of the basal antennal joint, a distance rather less than in a number of females before me which I am placing as *dubiosus*. In the type the lateral marginal bead is scarcely visibly darkened and the outer elytral vitta occupies the eighth interspace for a shorter distance than in any other specimen seen by me. In one example (San Antonio, Tex.), the elytral vittae are faint.

Length 2.7 to 3.8 mm.; width 1.45 to 2.2 mm.

Distribution.—*Texas*: The type was probably collected by Belfrage, as were certainly some examples before me from the National Museum Coll. Most of the specimens at hand carry simply the state label, but the following specific localities are represented. San Antonio, June 22 (Hubbard & Schwarz); Marfa, July 5 (Wenzel); Alpine, July 20 to 22, 4,400 to 6,000 feet (Wickham). *Kansas*: Clark Co., 1,962 feet, May; Morton Co., and Marion Co., all collected by Snow.

135. *Pachybrachys pawnee* new species

Yellow, lustre dull, prothorax with three black stripes not attaining the apical margin, the middle one furcate in front but not joining the lateral stripes; elytra with sutural bead and two discoidal stripes black, the outer one confined to the eighth interspace; front without ocular lines; front claws of male distinctly enlarged. Ave. length 3.25 mm. *Kansas*; *Dakota*.

Head yellow with occipital spot and median line extending from it to middle of front, black; punctuation coarse, uneven; eyes separated by about twice (σ) or three times (φ) the length of the basal antennal joint. Antennae three-fourths (σ) or one-half (φ) the length of the body, outer joints narrowly triangular, the tenth about two and one-half times as long as wide in the male, outer joints more or less blackish.

Prothorax rather small and strongly transverse, moderately arcuately narrowed in front, punctuation rather coarse and close, a little sparser along the side margins.

Elytra confusedly punctured in basal half between the inner black vittae and the suture, otherwise quite regularly striate; striae moderately impressed, the submarginal one only slightly sinuate behind the humerus, marginal interval impunctate, shield wanting.

Pygidium yellow with black base. Body beneath black, with last ventral margined with yellow. Legs yellow.

Length 3 to 3.5 mm.; width 1.5 to 1.9 mm.

Distribution.—*Kansas*: Omega, type σ , (collected by Crevecoeur ?; Medora, June 10; Salina (Knaus); Ft. Scott, May 23 (Soltau—Nat. Mus. Coll.); Douglas Co. and Wallace Co. (Snow). *Dakota*: (Wenzel Coll.).

136. *Pachybrachys vau* new species

Pale yellow or testaceous, integuments polished, prothorax with a median V shaped mark and a vitta each side, the elytra with the suture and two discal stripes, black; the outer stripe occupying the seventh and eighth interspaces. Front without ocular lines, front claws of male not at all enlarged. Ave. length 3.25 mm. Texas and Colorado to Arizona.

Head barely as wide as the thoracic apex, front very sparsely punctate, the black marks small and sharply outlined. Eyes in the male separated by twice the length of the basal antennal joint or slightly more, only very little more distant in the female. Antennae short, blackish in outer half, attaining only the hind coxae in the male and still shorter in the female, tenth joint a little more than twice as long as wide.

Prothorax moderately transverse, sides moderately arcuate and convergent, punctuation sparse, closer in the black markings, side margins smooth; scutellum black, except rarely.

Elytra with a few confused punctures along the suture near the base, otherwise regularly striate, the striae rather lightly impressed, eighth scarcely sinuate behind the humerus; marginal interspace impunctate, shield wanting, vittae subequal in width, the outer one confined to the seventh and eighth interspaces.

Pygidium black with two yellow apical spots. Body beneath black, last ventral segment broadly yellow at sides, the preceding segments sometimes narrowly so. Legs entirely pale yellow.

Length 2.75 to 3.75 mm.; width 1.35 to 2 mm.

Distribution.—*Arizona*: Bright Angel, July 5 (type ♂); July 14 (Barber and Schwarz); Santa Rita Mountains, June and July (Snow); "Ari" (Hom Coll.); (Morrison—Nat. Mus. Coll.). *Utah*: American Fork, June 24 (Hubbard & Schwarz); Salt Lake, June 13 (Hubbard & Schwarz). *Colorado*: (Leng Coll.); Ft. Collins, June 8 (Wickham Coll.) (also in Liebeck Coll.); Platte Cañon, June (Dyar and Caudell—Nat. Mus. Coll.). *Texas*: Fedor; Tex. (Belfrage—Nat. Mus. Coll.); Chisos Mountains July 16, and Round Mountain (Wenzel).

Var. imperfectus new variety

In this variety or race the markings are precisely of the same type but in nearly all specimens seen are of some shade of brown rather than black, and are narrower and more or less imperfect, or even in great part obliterated. The eyes appear to be slightly closer in both sexes, their distance apart in the male being not greater than the vertical width of their upper lobes, or barely twice the length of the basal antennal joint, while in typical *vau* they are a little more widely separated than the width of their upper lobes and by fully or rather more than twice the length of the basal joint of the antennae. The elytra are also finely transversely wrinkled and less shining than in *vau*, in which the surface is more highly polished. The antennae seem even a trifle shorter than in *vau* but this may be illusory. The scutellum is largely yellow. Size as in *vau*.

Distribution.—*Texas*: (Belfrage in Nat. Mus. Coll.); Flatonia, July 30 (Wenzel), type ♂; Maedona, July 28 (Wenzel); Lee Co., July 2 (Birkmann); Cypress Mills, Sept. 1, and New Braunfels (Leng Coll.).

137. *Pachybrachys umbraculatus* Suffrian

Pale dull yellow, minutely alutaceous but somewhat shining; prothorax with a blackish Y shaped median vitta and a lateral vitta each side inclosing (as usual) somewhat imperfectly an external pale spot; elytra each with a rather narrow blackish median vitta often imperfect or even nearly obsolete, also with the extremities of a second vitta represented by a blackish spot on the shoulder knob and another on the sixth interval exterior to the apex of the median vitta. Front without ocular lines; front claws of male not enlarged. Ave. length 3.7 mm. Arizona to western Texas.

Head not very closely, subevenly punctate, black markings small; eyes in the male separated by about one and three-fourths times the length of the basal antennal joint or by a little more than the vertical width of their upper lobes, in the female by twice the length of the basal joint. Antennae (♂)

scarcely three-fourths the length of the body, outer joints blackish, tenth not quite three times as long as wide.

Prothorax moderate, punctuation sparse except in the dark markings, smooth along the side margins. Scutellum largely yellow.

Elytra with a few irregularly placed punctures along the suture at base, otherwise completely striate, the striae feebly impressed, fifth and sixth often a little disturbed or irregular at middle; second interspace broad in the position of the shield, gradually narrowing posteriorly and more rapidly so toward the front; marginal interspace impunctate, eighth stria without post-humeral interruption. The median vitta occupies imperfectly the third and fourth interspaces; the external spot representing the end of an exterior vitta is on the sixth interspace.

Pygidium yellow with a broad basal margin and a fine apical marginal line terminating in a small dot each side, blackish. Legs yellow, hind thighs with a fuscous median spot.

Length 3.5 to 3.9 mm.; width 1.8 to 2 mm.

Distribution.—*New Mexico*: Lone Mountain, July 7 (Cockerell); Albuquerque, June 28 (Wickham). *Arizona*: (Soltan—Nat. Mus. Coll.), (Schaeffer Coll.); Santa Rita Mountains, July (Snow); Prescott, July (Van Dyke). *Texas*: (Schaeffer Coll.); Chisos Mountains, July 10 to 26 (Wenzel).

That this species is Suffrian's *umbraculatus* is probable but not altogether certain. A specimen among some Mexican material from the Nat. Mus. Coll. is so labeled by Mr. Schwarz and seems to fit the description sufficiently well. Others so named received lately from the British Museum are less typical—judging from the description—but apparently conspecific. Among this latter material, however, are two examples bearing name *labyrinthicus*, which are unquestionably identical with the Nat. Mus. *umbraculatus*; evidently a mistake somewhere. And right here let me say—as an example of the difficulty of obtaining reliably determined material, that I have received three examples from the British Museum and two from the National Museum, purporting to be *labyrinthicus*. Of the former, two are apparently *umbraculatus* as indicated above, the other is certainly different, while the Nat. Mus. specimens (also from the Biologia Material) are quite distinct from the other two. Some one of the three species may be *labyrinthicus* but only expert comparison with the type will settle the question.

138. ***Pachybrachys pallidipennis*** Suffrian

Robust, above yellow, head with standard black markings, prothorax with heavy complete black M, elytra with the sutural edge and tip of the shoulder knob black; elytra regularly striate;

eyes widely distant, ocular lines wanting; front claws of male not appreciably enlarged. Ave. length 4 mm. Kansas and Texas.

Antennae moderate, dusky toward the tip.

Prothorax strongly arcuately narrowed toward the front, punctuation rather dense and moderately coarse, more or less substrigose in the lateral branches of the M, narrowly sparser along the side margins.

Elytra with eight regular and entire subimpressed punctured striae, a short scutellar stria, and within the latter a few irregularly disposed punctures along the suture; eighth stria not interrupted basally, the marginal interspace impunctate, shield wanting.

Pygidium black at base, broadly apically yellow; body beneath black, the last ventral segment in great part yellow; legs yellow.

Length 3.5 to 4.5 mm.; width 2.2 to 2.8 mm.

Distribution.—*Texas*: (type); Lavaca Co., May 27 (Hubbard & Schwarz); Macdona, July 28 (Wenzel); "Tex.," many examples without indication of exact locality—various collections. *Kansas*: (various collections); Douglas Co. (Snow).

The above rather short description is quite sufficient for the recognition of this very distinct species, which is scarcely approached by any other in the regularity and completeness of the elytral striation. In the male the elytra are slightly but obviously gradually narrowed from the humeri, much as in certain pubescent species, e. g. *xanti*. This species is exactly the *striatus* of LeConte. The black variety referred to by LeConte is from Garland, Col., and is not identical; it is quite surely Say's *nigricornis*.

139. *Pachybrachys othonus* Say

Robust, black, prothorax with the entire margin and a narrow median anterior stripe yellow, elytra each with rather narrow sub-sutural, discal and marginal vittae yellow, legs yellow; eyes widely separated in both sexes, front without ocular lines; front claws of male not enlarged. Ave. length 3.4 mm. United States and Canada from the Atlantic Coast to the Rocky Mountains.

Head closely punctate in the dark areas, which vary much in extent; eyes separated in the male by about two and three-fourths and in the female by fully three times the length of the basal antennal joint or by fully the vertical length of the eye. *Antennae* moderate, black, more or less pale toward the base.

Prothorax strongly transverse, sides distinctly convergent in front, more or less rounded in behind, surface very densely substrigose punctate and dull, the median anterior yellow line and yellow margins, smooth.

Elytra nearly regularly striate, the outer striae moderately impressed, the eighth without subbasal interruption, punctures irregularly disposed in a narrow baso-sutural region, marginal interspace impunctate, shield wanting.

Pygidium black with apical yellow spots of variable size. Body beneath black, apical margin of last ventral segment in part yellow. Legs yellow, the hind thighs often with fuscous spot, the exterior margin of tibiae dusky toward the apex.

Length 3 to 3.75 mm.; width 1.75 to 2.3 mm.

Distribution.—*New Hampshire*: Durham (Wickham Coll.). *Massachusetts*: Tyngsboro, July 20; Framingham, June 10 (Frost); Cambridge (Hubbard & Schwarz). *Rhode Island*: Berkeley. *Connecticut*: (Leng). *New York*: Elmira (Van Duzee—Nat. Mus. Coll.); "Vicinity of New York City"; West Hebron, June 20, and Peekskill (Leng); "N. Y." (various collections). *New Jersey*: (Leng, Liebeck, and Nat. Mus. Colls.). *Pennsylvania*: Delaware Water Gap, June 15 (Liebeck); Glenolden, July 14 (Wenzel); "Penn." (various collections). *Distric of Columbia*: Washington, May 29 (Hubbard & Schwarz). *Maryland*: Oakland, July 10 (Hubbard & Schwarz). *North Carolina*: (Horn Coll.); Cranberry, June 9 to 19 (Wenzel); Black Mountains, June (Van Dyke). *Georgia*: Clayton (Leng). *Florida*: Key West (Leng). *Alabama*: Wadley (Soltau—Nat. Mus. Coll.). *Ontario*: Toronto (Crew—Wickham Coll.). *Ohio*: Cincinnati, June 6 (Dury). *Michigan*: Big Rapids (Nat. Mus. Coll.). *Iowa*: Iowa City, May 19 to June 25 (Wickham); Chariton (Shimek—Wickham Coll.). *Missouri*: (Nat. Mus. Coll.). *Arkansas*: (Wenzel Coll.). *Oklahoma*: So. McAlester, June 11 (Wickham). *Kansas*: Medora (Knaus); Douglas Co. (Snow); Riley Co. (Popenoe—Nat. Mus. Coll.); "Ks." (various collections). *Manitoba*: Winnipeg (Wickham Coll.). *Colorado*: Colorado Springs, June (Hubbard & Schwarz); "Col." (Horn, Wickham and Wenzel Colls.).

This widespread and common species is so well known that little comment is necessary. The fact that the yellow stripes of the elytra are narrower than the black would lead one naturally to describe the elytra as black with yellow vittae; they may, however, with equal or perhaps greater propriety be described as yellow with a sutural and two moderately wide discal vittae and the lateral edge, in part, black.

140. *Pachybrachys praeclarus* Weise

Robust, black, moderately shining, external margins of prothorax and elytra pale yellow; eyes widely distant, front without ocular lines; elytra regularly striate, except basally near the suture; front claws of male not enlarged. Ave. length 3.75 mm. Indiana to South Dakota.

Head closely punctate, dull; eyes small, separated by distinctly more than their own vertical length, even in the male. Antennae moderate, not very slender, black, dull rufous beneath toward the base, tenth joint scarcely three times as long as wide (σ^7).

Prothorax broad, strongly rounded or subinflated behind (σ), strongly narrowed in front; punctures close, rather coarse, elongate, with a tendency toward strigosity laterally; pale lateral margin narrow, sparsely punctured.

Elytral punctures arranged in moderately impressed regular striae except in a narrow baso-sutural region, interspaces minutely wrinkled, moderately shining; eighth stria not interrupted near the base, marginal interspace impunctate.

Pygidium, body beneath, and legs black.

Length 3.5 to 3.8 mm.; width 2 to 2.2 mm.

Distribution.—*Indiana*: Marshall Co., June 24 (type—*elegans* Blatchley). *Illinois*: (LeConte Coll.); N. Ill., June 14 (Am. Ent. Soc. Coll.). *South Dakota*: Black Hills, June 24 (Nat. Mus. Coll.). *Manitoba*: Winnipeg, June 24 (Wallis). *California*: One example so labeled in the LeConte Coll., perhaps in error.

The pale elytral margin involves the upper part of the epipleural lobe, the marginal (ninth) interspace, and sometimes the posterior part of the eighth interspace; in some examples in the LeConte Collection it is entirely lacking.

This species is most nearly allied to certain forms of *autolyceus*, having a somewhat similar prothoracic punctuation. It is thus far extremely rare.

141. **Pachybrachys autolyceus** new species

Yellow, moderately to rather strongly shining; prothorax with moderate to broad sharply defined black M, the lateral vittae rarely disconnected from the median one; elytra each with two discal vittae and the suture black, varying to black with sub-sutural vitta and margin yellow (vars *difficilis* and *wahsatchensis*). Eyes very distant, front without ocular lines; front claws of male not enlarged. Ave. length 3.2 mm. Maine to Washington State and Arizona.

Head not at all wider than the thoracic apex, front rather closely punctate medially, more sparsely so toward the vertex, surface finely alutaceous but moderately shining, black markings usually broad and sharply defined. Eyes separated by nearly three times the length of the basal antennal joint or by fully their own vertical length in the male, a little more distant in the female. Antennae black, more or less yellow basally, of moderate length, tenth joint two and one-half to two and three-fourths times as long as wide.

Prothorax moderately (σ) to strongly transverse, sides variably rounded, evidently convergent in front, surface either moderately shining and finely alutaceous throughout, or more strongly shining with very fine alutaceous sculpture only detectable toward the sides; punctuation moderately close medially, closer toward the sides, where the punctures are often more elongate with a tendency toward strigosity; lateral margins narrowly smooth.

Elytra with the punctures in nearly regular rows, striae distinctly impressed laterally, more finely so toward the suture, intervals finely transversely wrinkled, shield wanting; eighth stria not interrupted near the base, marginal interspace impunctate or nearly so; black vittae typically rather narrow but frequently wide, the outer one beginning on the seventh and eighth interspaces and ending on the sixth and seventh.

Pygidium black with large yellow apical spots. Body beneath black, last ventral apically yellow. Legs yellow.

Length 2.5 to 3.9 mm.; width 1.35 to 2 mm.

Distribution.—*Kansas*: Meade, June 12 (Knaus), type ♂; Medora, May; McPherson; Onaga, June 16; "So. Kan" (all in Knaus Coll.); Clark Co., June; Hamilton Co.; Wallace Co.; Douglas Co.; Sedgwick Co., June (all in Snow Coll.); W. Kan (Popenoe—Nat. Mus. Coll.); Ks. (Williston in Horn Coll.). *Texas*: (Hubbard & Schwarz). *Colorado*: (Snow), (Leng Coll.), (Nat. Mus. Coll.); Pagosa Springs, July (Baker—Nat. Mus. Coll.). *Montana*: (Leng Coll.), (Schaeffer Coll.); Glasgow, June 27. *New Mexico*: Beulah, June 29 (Am. Ent. Soc. Coll.); N. Mex. (Dury).

Var. **difficilis** new variety.

Front more black than yellow; prothorax heavily marked, the sides, two basal spots and the median line anteriorly yellow; elytra black with a narrow subsutural vitta,—sometimes imperfect—a small basal intrahumeral spot and the side and apical margins, yellow. The prothorax is nearly similar in form and sculpture to the type form, and is—so far as my experience goes—never so strongly transverse as in some Montana and Colorado examples of true *autolyceus*, nor does the punctuation show any tendency toward strigosity laterally as in some of these latter. Certain examples of true *autolyceus* approach the present form in their wider and more approximate discal vittae, and I am unable to consider this as anything more than a varietal form in which the vittae become fused, leaving only the intrahumeral spot and occasionally some slight discal traces to represent the intermediate yellow vitta.

Distribution.—*Massachusetts*: Tyngsboro, July 5, ♂ type. *Maine*: Wales, June 19 (Frost). *Michigan*: Detroit (Hubbard & Schwarz). *Colorado*: Rabbit Ears Pass, 10,000 feet, July 21 (Liebeck Coll.). *Arizona*: Ash Fork, June 18 (Barber & Schwarz); apparently not at all different from the eastern specimens.

Var. **wahsatchensis** new variety

This name is assigned to a local race which is closely similar to *difficilis*, but differing constantly in the numerous specimens

seen, in lacking entirely the intrahumeral yellow spot, and in having the legs brownish piceous with the front tibiae and parts of the front femora paler. The median line is more distinctly impressed toward the vertex of the head than in *difficilis*, as a rule.

Distribution.—*Utah*: Wahsatch Mountains, June 27 (Hubbard & Schwarz), taken abundantly; type ♂. *Montana*: Kalispell (Wickham). *Washington Territory*: (Hubbard & Schwarz).

The typical form *autolyceus* goes generally as *litigiosus* in collections, but the latter is an Atlantic Coast species, distinctly different by its generally longer, more sparsely punctured and more conspicuously alutaceous prothorax. The darker forms, including *difficilis*, have also generally gone as *litigiosus* var. and were so held by LeConte, who by the way attached his *litigiosus* label to a western specimen of *autolyceus* rather than to the true *litigiosus*.

Through those examples of *autolyceus* with strongly transverse prothorax with substrigose lateral punctuation this species approaches *othonus*, and through *wahsatchensis* it approaches *nigricornis*; indeed it is far from unlikely that both *wahsatchensis* and *difficilis* are the more usual forms of the rare *nigricornis*; in which case *autolyceus* would have to follow unless some one shall prove more successful than I have been in finding a dividing line.

142. **Pachybrachys nigricornis** Say

Black, prothorax and elytra obscurely margined with rufous, the latter also with a more or less obscure and imperfect subsutural line of same color; integuments strongly shining, the head only, very minutely alutaceous, the elytral interspaces finely transversely wrinkled; eyes rather small and very widely separated, no ocular lines; elytra regularly striate; front claws of male small. Ave. length 3.2 mm. Kansas, Colorado.

Head sparsely finely punctured on the vertex, the front more coarsely and closely so, especially in the median impression; eyes separated by slightly (♂) or distinctly (♀) more than their own vertical length. Antennae black, rufous toward the base, not very slender, only about half as long as the body in the female, tenth joint two and one-half times as long as wide or a little more in the male, twice as long as wide in the female.

Prothorax only moderately transverse, sides distinctly convergent in front, rather strongly rounded posteriorly in the male, less dilated and feebly arcuate in the female, rather coarsely moderately closely punctured, the side margins narrowly smooth.

Elytra regularly striate, the striae moderately impressed, more distinctly so

laterally as usual, the short scutellar striae alone confused, eighth stria not interrupted near the base, shield undeveloped, marginal interspace impunctate.

Pygidium entirely black, or with two small and obscure apical rufous spots. Body beneath black, a small rufous spot at sides of last ventral segment in some examples. Legs black, the tibiae brownish piceous.

Length 3 to 3.4 mm.; width 1.7 to 1.8 mm.

Distribution.—Say's locality is "Missouri," which as is generally known means the plains of Western Kansas and Nebraska extending perhaps to the Rocky Mountains. Nearly all the examples before me are from *Colorado* viz. Colorado Springs, June 15 to 30, 6,000 to 7,000 feet (Wickham); Garland, June 29 (Hubbard & Schwarz), (Nat. Mus. Coll.), (LeConte Coll.), July 25 (W. J. Gerhard); "Col" (several collections). *Kansas*: one ♂ (Horn Coll.).

This species seems to be rare, or at least this is true of the typical form. There is very little in the original description or in the specimens before me to separate it from the suffused varieties of *autolyceus*, and future collecting may establish their identity. In the dark varieties of *autolyceus*—*vahsatchensis* and *difficilis*—the pale markings are always bright yellow; in *nigricornis* they are described as "obscure rufous" and this is the case in the specimens at hand. In addition to the rufous margin and subsutural vitta mentioned in the description, the raised basal margin of the elytra is dull rufous, and there are detectable in some examples two very small and obscure basal thoracic spots of the same color. Say did not mention these basal spots, but they may very easily have been overlooked. He does say that "one or two of the interstitial lines of the elytra are sometimes very obscurely rufous, particularly in the larger females." This is not the case in the specimens at hand. The lateral rufous margin typically extends around the apex of the elytra, but is sometimes evanescent posteriorly and may entirely disappear, a fact noted by Say in his description; the thoracic markings may also entirely disappear.

The Garland, Colorado, specimen in the LeConte Collection is placed with *striatus* (= *pallidipennis* Suffr.) and is referred to by LeConte as a black variety of the latter.

143. *Pachybrachys carbonarius* Haldeman

Black, prothorax strongly alutaceous and opaque, more finely punctate than the elytra, the latter dull or feebly shining; eyes very distant, front without ocular lines; front claws of male not enlarged. Ave. length 3 mm. New York and Florida to Kansas and Louisiana. Var. *janus*—Nebraska to Manitoba and the Rocky Mountains.

Head scarcely wider than the thoracic apex, but the eyes are usually a little prominent as viewed from above; front opaque, not very closely punctate. Eyes separated in the male by fully three times the length of the basal antennal joint or by a distance greater than their own vertical length, in the female by nearly or quite one and one-half times their vertical length. Antennae moderate, black, obscure brownish red toward the base, tenth joint scarcely two and one-half times as long as wide in the male.

Prothorax moderately transverse (♂), or more strongly so (♀), punctuation rather dense, not coarse, nearly uniform in distribution.

Elytra conspicuously more coarsely punctate than the thorax, punctures confused medio-basally, elsewhere arranged in moderately impressed lines, which may be either quite regular or considerably confused; submarginal stria straight or but slightly sinuate basally, marginal interspace with few to many punctures; shield not distinct; color usually entirely black, very rarely with the elytral margin at apex in part rufous.

Legs black in general aspect, but with the tips of the femora and the tibiae obscurely brownish.

Length 2.5 to 3.75 mm.; width 1.35 to 1.85 mm.

Distribution.—*New York*: Peckskill (Sherman); Van Cortlandt, July 2, (Zabriskie—Nat. Mus. Coll.); "vicinity of New York City" (Beyer); N. Y. (Leng Coll.). *New Jersey*: (Nat. Mus. Coll.); Da Costa; Westville, Aug. 14 (Wenzel). *District of Columbia*: Washington, May to June (Hubbard & Schwarz). *Georgia*: Tybee Island, July 2 (Wenzel). *Florida*: Tampa, May 21, and New Smyrna, June (Hubbard & Schwarz). *Alabama*: Mobile, April to July (Loding); Wadley (H. H. Smith—Nat. Mus. Coll.). *Louisiana*: Vernon Parish (Leng Coll.). *Arkansas*: Howard Co. (Wickham). *Missouri*: (Nat. Mus. Coll.), (Liebeck Coll.); St. Louis (Nat. Mus. Coll.). *Kentucky*: (Am. Ent. Soc. Coll.). *Illinois*: Algonquin (Nason); So. Ill., May 26 (Soltan). *Michigan*: Marquette, July 8 to Aug. 1, (Hubbard & Schwarz). *Minnesota*: Jackson Co., June (W. S. Marshall—Nat. Mus. Coll.). *Kansas*: Baldwin (Wickham Coll.); Onaga (Wickham Coll.); So. Kans. (Knaus); Douglas Co. (Snow) identity doubtful. *Nebraska*: Fillmore (Am. Ent. Soc. Coll.).

Var. **janus** new variety

Specimens from Nebraska (type ♀), Dakota, Montana, Colorado, and Manitoba (Brandon), differ more or less obviously from typical *carbonarius* of the South and East by the more shining surface—especially of the prothorax—of which the alutaceous sculpture is less pronounced. This form lies exactly between typical *carbonarius* and *nigricornis* and merges into both so gradually that I am as yet completely unable to draw the dividing lines. The difficulty of separating *nigricornis* from the dark varieties of *autocteus* has already been alluded to, and as these varieties connect gradationally with the typical form, there results a gradual transition from the bright yellow, black vittate

autolyceus, to the entirely dull black *carbonarius*. That the extremes are specifically distinct I do not for a moment doubt, but just what the intermediate relationships are is a problem for the future student. No examples of *janus* show a trace of the sub-sutural vitta of *nigricornis*, but several have the epipleural lobe dark rufous or rufescent, and in one example this color continues obscurely along the marginal interspace to the suture. It seems quite probable that some of Say's specimens of *nigricornis* lacking the rufous clytral margin were of the present form.

144. ***Pachybrachys picturatus*** Germar

Pale whitish yellow, lustre dull, prothorax with a narrow black M, clytra with sutural bead and a single narrow median vitta attaining the convexity, and the tip of the shoulder knob, black; front without ocular lines; front claws of male not enlarged. Ave. length 3.6 mm. North Carolina.

Head just perceptibly wider than the thoracic apex, finely, not closely punctate, markings black and sharply defined, front predominantly pale. Eyes separated in the male by fully twice the length of the basal antennal joint, the distance slightly greater than the vertical length of the eye, in the female by nearly three times the length of the basal antennal joint. Antennae of moderate length, black, yellow toward the base, first two joints blackish above, tenth joint nearly three times as long as wide (♂).

Prothorax moderately transverse, sides distinctly convergent and almost straight from near the base, punctuation fine and sparse, M narrow but complete. Scutellum yellow with black tip.

Elytral punctures more or less confused in a rather large baso-sutural area, the striae evident laterally and behind the middle, lightly or scarcely impressed, eighth stria scarcely disturbed behind the humerus, marginal interspace wide with a few punctures near the base; shield indistinct.

Pyggidium pale yellow with the basal margin blackish; body beneath yellow and black; legs entirely pale.

Length 3.4 to 3.8 mm.; width 1.9 to 2.15 mm.

Distribution.—*North Carolina*: (J. B. Smith—Nat. Mus. Coll.), (Am. Ent. Soc. Coll.), (Leng Coll.); *Wilmington* (Wenzel).

Whether this is the true *picturatus* of Germar or not I do not know. The single specimen in the Nat. Mus. Coll. bears this name, and the one in the Leng Coll. appears to be doubtfully so placed. The original description is short, but fits very well except that there are said to be six black spots on the prothorax. It might easily happen that the thoracic M, which is entire in the few specimens at hand, is broken up into six spots in the type, and as the original description does not at all apply to any other

eastern species I have no great hesitation in using the name for the present one. I do not know on whose authority the *M-nigrum* of Melsheimer is placed as a synonym of *picturatus* in the Henshaw List, but there is absolutely nothing in the descriptions to warrant such a course.

This is one of our rarest species, and thus far only five specimens have been seen by me. It is probably quite restricted in range.

145. **Pachybrachys viduatus** Fabricius

Size large, yellow, with sharply defined and rather broad black frontal marks and thoracic M, elytra with sutural bead, median vitta and narrower lateral vitta black, punctuation dense—especially in the female—and usually with but slight traces of striae; eyes widely separated; front without ocular lines; front claws of male not appreciably larger. Ave. length 4 mm. Gulf States.

Head not at all wider than the thoracic apex, front quite densely subevenly punctate; eyes separated by rather more than twice the length of the basal antennal joint in the male, and by two and one-half or two and two-third times the length of the basal joint in the female; terminal joint of maxillary palpi nearly as pointed in the male as in the female. Antennae nearly as long as the body in the male, yellow with the tip of the terminal joint dusky, more rarely with basal and several of the outer joints blackish, tenth joint four times as long as wide in the male, and nearly so in the female.

Prothorax not very strongly transverse, sides moderately rounded and convergent in front, surface densely subevenly punctate, more sparsely so along a narrow lateral margin, apical margin pale throughout; M broad, entire, sharply defined, leaving three discal yellow spots, two basal and one anterior median one connected with the front margin.

Elytra rather variably but more or less densely confusedly punctate without impressed striae, though with the punctures here and there showing serial arrangement in longer or shorter lines; shield wanting; marginal interspace punctured in the female, more sparsely so in the male; disk with two black vittae attaining the declivity, the inner one wider, the outer one often interrupted posteriorly leaving a detached spot.

Pygidium black with two large, often confluent, oval apical yellow spots. Body beneath black, sides of last ventral segment yellow. Legs yellow, the bases of the thighs and apices of the tibiae often clouded with brownish shades; apical spur of front tibiae very small.

Length 3.5 to 4.5 mm.; width 1.85 to 2.35 mm.

Distribution.—*Georgia*: (Liebeck Coll.). *Florida*: (Leng Coll.); Key West (Leng). *Alabama*: Mobile and vicinity, June (Loding), (Soltau). *Louisiana*: Covington, June (Leng Coll.), (Wenzel Coll.), July 2 (Soltau). *Texas*: Tyler, July 7 (Soltau—Nat. Mus. Coll.).

The abundant and widespread *bivittatus* of Say has long passed as *viduatus* Fab., but the error has recently been pointed out by Bowditch. *Aibescens* Suffr. is then a synonym of *bivittatus*, as an examination of the type shows. The true *viduatus* is not at all closely allied to *bivittatus*, the only similarity being the vittate elytra; it is, however, quite closely related in most of its characters to *pulvinatus* and *trinotatus*.

146. ***Pachybrachys m-nigrum*** Melsheimer

Yellow with the standard markings black and so heavy or broadly confluent that the prothorax may best be described as black with two elongate basal spots, a narrowly oval median anterior spot, the side margins—broader at front angles—and the extreme apical edge, yellow; elytra black with the apex, two lateral transverse or subquadrate spots, the basal margin, an intrahumeral basal spot, a small basal spot near the suture, sometimes free, sometimes connected with the basal margin, and a median spot involving the shield, yellow. Eyes distant, front without distinct ocular lines; front claws scarcely at all enlarged. Ave. length 3.6 mm. Eastern United States.

Head not wider than the thoracic apex, closely not coarsely punctate, markings heavy; eyes separated by an average of about two and three-fourths times the length of the basal antennal joint, the disparity in the sexes in this respect scarcely noticeable. Antennae slender, differing but slightly in the sexes, in great part black, about four-fifths as long as the body, the tenth joint linear, four and one-half or five times as long as wide.

Prothorax moderately closely, nearly evenly, not very coarsely punctate, side margins smoother, the M heavily marked and fairly constant.

Elytral punctures coarser, confused in baso-sutural region, striae close, feebly impressed, variable in distinctness, fairly well defined—though sinuous—on the rear convexity and at the sides; marginal interspace subimpunctate to moderately numerous punctate; shield rounded, distinct. The inner standard spots are more or less completely confluent with each other longitudinally and across the suture and with the corresponding spots of the outer series leaving yellow spots as described in the above diagnosis, and sometimes also some scattered smaller ones along the suture.

Pygidium black with yellow apical spots. Body beneath black, last ventral with a small lateral yellow spot. Legs black and yellow, the femora black in the basal, the tibiae in the distal half.

Length 3.25 to 3.9 mm.; width 1.75 to 2.25 mm.

Distribution.—*New Hampshire*: Franconia (Mrs. A. T. Slosson); "N. H." (Nat. Mus. Coll.). *Massachusetts*: Tyngsboro, July 3 to Aug. 31, Draeut and Lowell (Blanchard); "Mass." (Nat. Mus. Coll.). *New York*: Peekskill (Leng); N. Y. City (Soltau); White Lake, July (Zabriskie—Nat. Mus. Coll.);

Staten Island, Aug. 3 (Leng); Washington Co. (Leng). *New Jersey*: Greenwood Lake (Leng); Da Costa (Boerner); Woodbury, June 24 (Wenzel); Merchantville, June 15 (Wickham Coll.); "N. J." (various collections). *Pennsylvania*: (Liebeck); Lehigh Gap, July 13. *District of Columbia*: Washington, June 28 (Hubbard & Schwarz); "D. C." (Leng). *Maryland*: (Liebeck); Plummer's Island, June 28 (Barber). *Virginia*: Fredericksburg, July 6 (Richardson); Pennington Gap, July 8 (Hubbard & Schwarz). *North Carolina*: Hertford Co., June 9 (Liebeck Coll.); L. Toxaway (Liebeck Coll.); Graybeard Mountain, (Van Dyke). *Georgia*: Clayton (Leng). *Illinois*: Galesburg, July 7 (Wickham); So. Ill., June 6 (Soltau), (Knaus); N. Ill. (Blanchard). *Iowa*: Iowa City, June 13 (Wickham); Burlington (Liebeck Coll.); Cedar Rapids (Brendel—Leng Coll.). *Kentucky*: Louisville (Soltau in Nat. Mus. Coll.). *Missouri*: St. Louis, June 13 (Wickham), (Leng Coll.), June 16 (Snow Coll.). *Kansas*: June (Nat. Mus. Coll.).

This is a common and widely dispersed species in the Eastern United States, and well known to all collectors. It varies somewhat in minor details of coloration, but on the whole is strikingly constant in general appearance. The nearly equally distant eyes in the sexes is unusual, and the apparent absence of the apical spur on the front tibiae is notable.

The *intricatus* of Suffrian is undoubtedly identical, as shown by a type sent by Dr. Taschenberg.

147. *Pachybrachys trinotatus* Melsheimer

Black, lustre dull, prothorax with the side margin—more widely in front—apical edge and three discal spots, fulvous; eyes separated by their own vertical length or more in both sexes; antennae very elongate with linear joints, predominantly black; front without ocular lines; front claws not at all enlarged in the male.

Ave. length 4.25 mm. Eastern United States.

Head not at all wider than the thoracic apex, moderately thickly rather finely punctate, black markings heavy, the front as a rule predominantly black with two superior triangular spots and a small post-elypeal spot, yellow. Eyes distant two and three-fourths—more or less—times the length of the basal antennal joint, and with very little sexual disparity. Antennae nearly as long as the entire body in the male, a little shorter in the female, tenth joint fully four times as long as wide.

Prothorax rather strongly rounded on the sides behind the middle, M heavy, sharply defined, leaving two elongate basal spots, an anterior median spot connected with the front margin, and the side margins yellow, punctuation dense or close throughout.

Elytra densely distinctly more coarsely punctate than the prothorax, the submarginal stria usually more or less distinct, the others not defined although

often with the punctures more or less serially arranged and with two slightly elevated discal costae extending back from the base for a variable distance; color almost entirely black, the basal edge often in part yellow, and sometimes with one or two other minute yellow spots; shield minute or wanting.

Pygidium, body beneath and legs entirely black; front tibiae without terminal spur, that of the middle tibiae unusually small.

Length 3.9 to 4.6 mm.; width 2.2 to 2.6 mm.

Distribution.—*New York*: Peekskill (Leng Coll.); Potsdam, July 7 (Liebeck); Colden (Van Duzee—Nat. Mus. Coll.); "N. Y." various collections. *New Jersey*: (Liebeck); Rahway, July 9 (Soltau—Nat. Mus. Coll.). *Pennsylvania*: West Park, Philadelphia, July 15 (Wenzel); Carlisle Junction, July 1 (W. S. Fisher). *Maryland*: Deer Park, July 1 (Hubbard & Schwarz). *Virginia*: Afton (Hubbard & Schwarz). *Tennessee*: Nashville, Aug. 4 to 15 (Wickham Coll.). *Michigan*: Detroit, and Grand Ledge, July 21 (Hubbard & Schwarz). *Ontario*: Ridgeway (Killman). *Missouri*: St. Louis (Schuster—in Leng Coll.); "Mo." *Arkansas*: Fayetteville, July 31 (Knaus). *Kansas*: (Nat. Mus. Coll.). *Oklahoma*: Wister, July 3 (Soltau—Nat. Mus. Coll.).

148. ***Pachybrachys pulvinatus*** Suffrian

So closely resembles *trinotatus* that a statement of differences only is necessary. The prothorax is a little narrower, less dilated behind, the sides straighter, the apical pale margin interrupted at middle by the black M in the great majority of specimens; elytral punctures even denser than in *trinotatus* but less coarse, without trace of striae except a feeble submarginal one, the upper margin of the stria forming a fine lateral costa, the discal costae faint or entirely wanting; elytra often and typically with a very few fulvous spots, a spot on the front thighs and the apices of the middle and hind thighs pale yellow. The sexual disparity in the width of the front between the eyes is a little more marked than in *trinotatus* in which it is not very obvious. As in *trinotatus* there is no visible terminal spur of the front tibia and the last joint of the maxillary palpi does not differ appreciably in the sexes. There is a good deal of variation in the markings, the elytra in the series before me varying from entirely black to entirely yellow except for a narrow sutural stripe, the tip of the humeral umbo and the posterior half of the side margin, black. The prothorax in a few examples is entirely black except for a small median subapical spot and a smaller pale dot on each side near the front margin.

Distribution.—*New Jersey*: (Liebeck Coll.). *Georgia*: Liebeck, Snow, Horn and Blanchard Colls.; probably all collected by Morrison. *Florida*: Capron, April 14; Baldwin, June 10; Enterprise, June 7 and Tampa, April 16 (all in

Hubbard & Schwarz Coll.); Key West (Leng Coll.). *Alabama*: Mobile and vicinity (Soltan in Nat. Mus. Coll.). *Louisiana*: Covington, June 2 (Soltan).

This species is unrecognized in almost all American collections, the specimens when present being included with *trinotatus*. Oddly enough all specimens under the latter name in the Horn Coll. are *pulvinatus*, the true *trinotatus* not being represented at least in the material sent me. The single example in the Blanchard Coll. is correctly labeled *pulvinatus* ("teste Austin") and those from same source in the Snow Coll. are also correctly identified. I have seen the Suffrian type or cotype sent Bowditch for examination.

149. ***Pachybrachys confusus*** Bowditch

Black, head with three or four small yellow spots, prothorax with the extreme anterior edge, a narrow median anterior line and two small basal spots yellow; elytra with the basal raised margin, some small spurs or spots adjacent thereto, the dot-like shield, a lateral spot at the posterior third and the apex, yellow; surface alutaceous, head and prothorax opaque, elytra dull or feebly shining. Eyes widely distant, front without ocular lines, elytral punctures diffuse, front claws rather strongly enlarged in the male. Ave. length 3.3 mm. District of Columbia to Louisiana.

Head not at all wider than the thoracic apex, rather finely not densely punctate; eyes separated in the male by two and one-half times the length of the basal antennal joint or by the vertical length of the eye, and in the female by fully three times the length of the basal joint and by distinctly more than the vertical length of the eye. Antennae rather slender, basal joint black, following joints brownish yellow, outer ones dusky, tenth joint three times as long as wide.

Prothorax feebly to moderately narrowed in front, sides very broadly curved, punctuation fine not close, nearly evenly distributed, side margins not smoother. The yellow marks named in the above diagnosis may disappear except for the anterior median line, and in one specimen this is reduced to a mere dot.

Elytra more coarsely punctate than the prothorax, the punctures confused throughout, with at most some fragments of striae toward the sides; shield small, rounded and somewhat raised.

Pygidium and body beneath black. Front thighs with an oval yellow sub-apical spot, middle and hind thighs black with the apical one-half or one-third yellow, knees black, tibiae yellow in about basal half.

Length 2.9 to 3.5 mm.; width 1.5 to 1.9 mm.

Distribution.—*Mississippi*: Natchez (Bowditch Coll.), ♂ type. *Louisiana*: Covington, June 2 (Soltan—Nat. Mus. Coll.). *Alabama*: Mobile, May 10

(Loding); Grand Bay (Loding in Bowditch Coll.). *Virginia*: Falls Church (Bowditch Coll.). *District of Columbia*: Washington, June 27 (Hubbard & Schwarz).

Bowditch also refers to this species certain females from Georgia, North Carolina and Pennsylvania, but there is possibly some uncertainty about identifications here.

In the type the yellow marks on the elytra are broader than in any example before me, so that Bowditch has described the elytra as yellow with broad confluent standard spots.

This species is tabulated both among the black and the mottled forms and in either case should be readily recognized by the tabular characters.

150. **Pachybrachys luridus** Fabricius

Of more than average size, dull black, densely coarsely punctured, elytra mottled with yellow, especially toward the sides, prothorax with anterior median line and sides red or reddish yellow, varying to elytra entirely yellow (var. *festivus*) or the whole insect entirely black (var. *nigrinus*), or black with the thorax almost entirely red. Eyes separated in the male by a distance not much greater than the length of the basal antennal joint; no ocular lines; front claws of male much enlarged. Ave. length 3.5 mm. United States and Canada westward to the Rocky Mountains.

Head not wider than the thoracic apex, densely coarsely punctate, median line impressed superiorly, entirely black or with two yellow spots between the eyes. Eyes not at all prominent, separated in the male by about the length of the first two antennal joints, or by a distance rather less than the vertical width of their upper lobes; in the female by barely twice the length of the basal antennal joint. Antennae thin, nearly as long as the body in the male, the tenth joint at least four times as long as wide in the male.

Prothorax strongly arcuately narrowed to the front, sides rounded in a little behind, surface densely coarsely punctured to the margins, the punctures sometimes showing a tendency to become longitudinally confluent medio-laterally.

Elytra with the disk broadly confusedly coarsely punctate, with more or less distinct striae at sides and rear, shield small, sometimes distinct, sometimes not; marginal interspace narrow, convex, with few to many punctures.

Pygidium and body beneath black. Legs black, front thighs often with an oval yellow spot, middle and hind thighs pale at base and apex in the lighter colored examples.

Length 2.75 to 4 mm.; *width* 1.5 to 2.35 mm.

Distribution.—*New Hampshire*: Franconia (Slosson). *Massachusetts*: Tyngsboro, July; Bourne, June 17; Holyoke, June 19 and Mt. Tom, July 1 (Wickham Coll.); Cambridge, May (Hubbard & Schwarz). *Rhode Island*: Berkeley, June. *New York*: (Nat. Mus. Coll.); Staten Island, June, on Baptisia (Leng); West Hebron, June 30 (Leng). *New Jersey*: (Nat. Mus. Coll.); Da Costa, June 5; Cape May C. H., May 28; Newark (all in Wenzel Coll.). *Pennsylvania*: Castle Rock, June 23 (Am. Ent. Soc.); Heckton Mills, May 31 (Fisher); Highspire, July 4 (Fisher). *Maryland*: (Liebeck). *District of Columbia*: Washington (Hubbard & Schwarz). *Virginia*: June 12 (Nat. Mus. Coll.). *North Carolina*: (Nat. Mus. Coll.); Cranberry, June 9 to 19; Wilmington (Wenzel); Black Mountains (Van Dyke). *South Carolina*: (Liebeck). *Georgia*: (Liebeck); Clayton, 2,000 to 3,700 feet (Leng). *Florida*: Jacksonville (Ashmead—Nat. Mus. Coll.); Key West (Leng). *Ontario*: Toronto (Wickham). *Illinois*: (Liebeck), (Leng), (Snow); Cook Co., July (Wickham). *Iowa*: Iowa City, May 26 (Wickham); Hoffman (Nat. Mus. Coll.); Spirit Lake (Liebeck). *Montana*: (Leng Coll.). *Dakota*: (Am. Ent. Soc. Coll.). *Nebraska*: (Liebeck Coll.); West Point, June (Nat. Mus. Coll.). *Kansas*: Douglas Co. (Snow); Salina (Knaus). *Missouri*: St. Louis (Nat. Mus. Coll.); Fern Glen, June 12 (Wickham Coll.). Kineswick, May 20 (Nat. Mus.). *Arkansas*: Hot Springs, May 28 (Horn Coll.), (Snow Coll.). *Louisiana*: Vowell's Mill (Leng Coll.). *Texas*: June (Nat. Mus. Coll.); Corpus Christi, May 12 (Schwarz); Dallas (Am. Ent. Soc. Coll.), (Blanchard Coll.).

Var. **nigrinus** Blatchley

This name has recently been given by Blatchley to the entirely black form. It is not uncommon and is likely to occur anywhere with the maculate forms.

Var. **festivus** new variety

Elytra entirely yellow except the shoulder knob, or with traces of some of the standard spots, prothorax with the median line and margin reddish yellow. The prothorax is typically more transverse and less narrowed in front than in the usual form, and the elytra are less coarsely punctate and less deeply striate at sides. These specimens look considerably different from ordinary *luridus* and may possibly be distinct, but intermediates are not lacking.

Distribution.—*Kansas*: (Knaus), type ♀; "Ks." (Nat. Mus. Coll.), Salina (Snow). *Nebraska*: (Nat. Mus. Coll.), (Liebeck Coll.); Lincoln (Nat. Mus. Coll.). *Minnesota*: Jackson Co. (W. S. Marshall—Nat. Mus. Coll.). *Colorado*: (Hubbard & Schwarz), (Am. Ent. Soc. Coll.), (Wenzel). *Arizona*: (Leng Coll.).

151. **Pachybrachys vulnerosus** new species

Very similar to *instabilis* in all respects except as follows. Front black without pale markings, prothorax with red side margins but without basal or other spots; punctuation of prothorax decidedly sparser and evidently coarser, the median smooth line wider, the red side margins nearly smooth or with but few punctures; elytral punctures coarser and less numerous. The maculation of the elytra is nearly as in the type of *instabilis* and consists of two small post-humeral red spots arranged transversely, a large subquadrate post-median spot, close to this externally a small spot on the eighth interspace, the tip, an elongate spot on the shield, and the epipleural margin at base, red. The second, third and eighth striae are entire, the latter strongly impressed and the marginal interspace convex, nearly as in *instabilis*.

Length 4.25 to 4.35 mm.; width 2.5 mm.

Distribution.—*Arizona*: Santa Rita Mountains (Snow). Two very robust females; type in my own collection, paratype in Snow collection.

It is quite probable that a larger series will show considerable variation in maculation; the color difference between this species and *instabilis* given above may therefore prove unreliable; the differences in punctuation however should easily separate them.

152. **Pachybrachys instabilis** new species

Black, variably marked with red or reddish yellow, the latter color occasionally predominant in the male; surface moderately shining, the prothorax with scarcely visible trace of alutaceous sculpture. Eyes moderately distant; front without ocular lines; front claws of male not appreciably enlarged. Ave. length 4 mm. Texas; Kansas.

Head black variegated with yellow or rufous, varying to entirely black; moderately punctate. Eyes separated by twice the length of the basal joint of the antennae in the male, and by about three times the length of the basal joint in the female. Antennae black, more or less rufous toward the base, about two-thirds the length of the body in the male and half the length of the body in the female; tenth joint (σ^7) about two and one-half times as long as wide.

Prothorax strongly narrowed in front, widest very near the base, sides a little more prominently rounded before the base in some males in which examples the point of greatest width is less basal; punctuation moderately coarse, dense, the median line wholly or in part narrowly smooth, side margins at most narrowly and incompletely so; color black with side margins and two basal spots red, varying to red with a median black stripe more or less dilated in front.

Elytra coarsely densely confusedly punctate baso-suturally, striate at sides and rear, striae moderately impressed, eighth with subbasal interruption, marginal interspace impunctate or with a few punctures toward the base (σ^7); shield undeveloped; color varying from red or reddish yellow with the outer

standard spots distinct, the inner ones more or less confluent, to entirely black; often black with an apical red spot or vitta extending forward a variable distance.

Pygidium, body beneath and legs black.

Length 3.5 to 4.5 mm.; width 1.9 to 2.6 mm.

Distribution.—*Texas*: Sparingly represented in most of the larger collections; with a single exception—"Round Mt." (Wenzel Coll.)—all examples, including the type female, bear simply the label "Tex.," or "S. W. Tex." *Kansas*: (Horn Coll.). *Oklahoma*: Stillwater (Nat. Mus. Coll.); a variety, almost entirely pale, is somewhat doubtfully referred.

This species goes as *subvittatus* in some collections, and in others as *hybridus*. It is in most of its color forms exactly intermediate between the two. From *hybridus* it may be distinguished with certainty by the small front claws of the male; it is also more robust, the prothorax is as a rule more densely and a little more coarsely punctate and the antennae are much less slender and elongate. Some males of *instabilis* approach *subvittatus* in color and markings, but the latter is truly yellow with a distinctly shorter prothorax which is trivittate, the median vitta divided in front, and the legs are pale.

153. ***Pachybrachys hybridus*** Suffrian

Black; prothorax red, varying to black with red side margins, moderately shining. Eyes separated in the male by one and one-third (more or less) times the length of the basal antennal joint, and by about twice the length of the basal joint in the female; ocular lines wanting; front claws of male very large. Ave. length 3.75 mm. California and Texas.

Head moderately punctate; eyes not at all prominent, separated in the male by a distance subequal to the vertical width of their upper lobes. Antennae very long and thin, nearly as long as the entire body in the male, black, more or less reddish brown toward the base, tenth joint four times as long as wide in the male and three times as long as wide in the female.

Prothorax moderately long, rather strongly narrowed in front, widest before the base, sides rounded in basally; punctuation fairly close, median line narrowly incompletely smooth, side margins narrowly subimpunctate, especially posteriorly.

Elytra coarsely confusedly punctured in a rather large baso-sutural triangle, striate more or less irregularly at sides and rear, the striae moderately impressed; shield small but evident, marginal interspace with a few punctures near the subbasal interruption of the eighth stria.

Length 3.3 to 4.2 mm.; width 1.8 to 2.3 mm.

Distribution.—*California*: San Diego, May 14; Pomona, May 13; Arrowhead, Mar. 31; Los Gatos (Hubbard & Schwarz); Los Angeles Co. (Coquillett); San Bernardino Co., and Santa Clara Co. (Koebele); Alameda Co. (Horn Coll.); Fairfax, Marin Co., June 10 (Van Dyke). *Lower California*: Ensenada (Beyer). *New Mexico*: Near Las Vegas Hot Springs, 1 ♀, identity doubtful (Snow Coll.). *Texas*: Round Mountain (Wenzel Coll.); "Tex." Collected by Belfrage, LeConte, Horn, Nat. Mus. and other collections, but always without indication of exact locality.

About the only notable variation exhibited by this species is in the color of the prothorax. This varies from fairly bright to dark blood red, and may be entirely without darker shades, quite often, however, the anterior margin is blackish at the middle, this color showing a tendency to spread backward even to the base. Rarely the entire surface except the side margins is black. The surface of the prothorax is sometimes barely visibly alutaceous, and at others quite evidently, though very finely so.

154. ***Pachybrachys discoideus*** Bowditch

Black, head and legs sometimes spotted with white or pale yellow; prothorax rarely entirely black, usually with side margins, front margin in part, and short median anterior line yellowish white; elytra orange red with wide black sutural stripe not attaining the apex; eyes in males separated by very little more than the length of the basal antennal joint; front claws of male large. Ave. length 3.4 mm. Florida; District of Columbia.

Head not wider than the thoracic apex, rather sparsely punctate, black with small whitish spots which are larger in the male, in which the front may be described as yellowish white with broad black typical markings. Eyes distinctly more approximate in the male than the vertical width of their upper lobes, and in the female slightly more distant than the width of their upper lobes, or by a little less than twice the length of the basal antennal joint. Antennae (♂) about three-fourths, or (♀) about one-half the length of the body, the tenth joint in the male fully three times as long as wide, basal joint and outer joints blackish, intermediate joints pale.

Prothorax strongly narrowed in front, sides as seen from above nearly straight or even faintly sinuate anteriorly, punctuation not close, rather fine, side margins smooth, surface semi-shining. The color may be described as in the above diagnosis, or as yellowish white with heavily suffused black M, leaving the side margins, front margin in part and frequently some smaller discal spots pale; of the latter the short median line in front, and more rarely two small basal spots are most noticeable.

Elytra with confused punctures in the baso-sutural region, elsewhere with the punctures serially or sub-serially arranged in unimpressed lines, the eighth

stria slightly impressed and more regular, as usual. Shield not noticeable; marginal interspace wide and with a few punctures, especially near the base.

Pygidium and body beneath entirely black. Legs sometimes entirely black, front thighs often with a whitish spot in front, hind thighs sometimes with white base and tip, middle thighs more rarely so.

Length 3 to 3.7 mm.; width 1.7 to 2.2 mm.

Distribution.—*Florida*: Enterprise, April and May (many collections); Haulover, March and Tampa, April (Hubbard & Schwarz); Melbourne, March (Liebeck Coll.); Key West and Green Cove Spring (Leng Coll.); Estero, May 6 to 12 (Van Duzee—Wickham Coll.); Jacksonville; Bellaire. *District of Columbia*: Washington (Linell—Nat. Mus. Coll.).

Bowditch describes under the name *discoideus* a unique female from "P. Orange," Florida, from the Snow Collection, in which the type remains. I am unable to discover in the description any good reason for separating this from *limbatus* Newm. to which its author declares it is allied, but without giving any distinctive characters; and inasmuch as Newman's name is preoccupied, *discoideus* becomes the name of the species.

155. *Pachybrachys marginatus* Bowditch

Black, front sometimes with two or three small reddish spots; prothorax and elytra with a wide red border which may be partially interrupted at the elytral convexity, and in one male is completely so. The surface lustre though alutaceous is—at least in some examples—less dull and opaque than in *cruentus*, the eyes a trifle more distant (though this also is not constant), the prothorax with evident smooth median line, the legs uniformly black throughout, form, size and sculpture otherwise almost precisely as in *cruentus*.

Distribution.—*Arizona*: Prescott (Bowditch Coll.), type; Williams May 29 to 31 (Barber & Schwarz); Ariz. (Am. Ent. Soc. Coll.).

The following variety looks quite different from the typical form and might easily be taken for a distinct species.

Var. *sanguineus* new variety

Upper surface entirely dull red except for three small basal spots on the prothorax, the scutellum and sutural bead of the elytra, black; otherwise as in the typical form. In one example there are two vague sutural dusky clouds on the elytra.

Distribution.—*Arizona*: Chiricahua Mountains, June 4 to 6 (V. L. Clemence), type female, same locality, June 2 (Hubbard & Schwarz); Santa Rita Mountains, May (Hubbard & Schwarz); Williams, June 16 (H. A. Wenzel); "Ari." (Am. Ent. Soc. Coll.), (Liebeck Coll.).

In both forms of this species the elytral punctuation—especially in the female—seems a bit finer than in *cruentus*, with the punctures slightly elongate. All specimens show the impunctate median line on the prothorax, while in no example of *cruentus* before me is it at all distinct, though LeConte mentions such a

variety. *Marginatus* is not especially related to *limbatus* Newm. (= *discoideus* Bowd.), with which Bowditch affiliates it in his description.

156. ***Pachybrachys cruentus*** LeConte

Black, elytra with a broad red margin occupying the outer half and interrupted at the convexity; elytral punctuation mostly confused, one or two lateral striae only distinct and entire, the interval between the seventh and eighth somewhat more convex; front without ocular lines; front claws of male not appreciably enlarged. Ave. length 3.5 mm. Texas.

Head and thorax dull, opaque, front between the eyes broadly feebly impressed along the median line, punctuation moderate; eyes separated by one and one-half to one and three-fourths times the length of the basal antennal joint in the male and by about twice the length of the basal joint in the female. Antennae moderate, dull yellowish with the basal joint in part, and the outer joints, blackish; tenth joint a little more than twice as long as wide in the male.

Prothorax quite strongly narrowed in front, sides broadly arcuate, punctuation not very coarse and only moderately close, a little uneven, with at most only a trace of a median impunctate line; side margins not distinctly smoother.

Elytra more coarsely punctured than the prothorax, the punctures broadly confused on the disk, the two lateral striae more or less distinct and a little impressed, declivity with the punctures usually a little finer, in part subserially arranged but not in impressed lines; shield wanting; marginal interspace impunctate or nearly so.

Pygidium, body beneath and legs black, the femora sometimes brownish at base.

Length 3 to 4 mm.; width 1.6 to 2.1 mm.

Distribution.—*Texas*: The type, and most of the few specimens seen were collected by Belfrage. "P. Saddle" (Leng Coll.).

This species is readily recognized by the color, which is apparently quite constant. The elytra might with equal propriety be described as red with a broad black sutural stripe which is connected at the convexity with a marginal spot. It is very nearly related to *marginatus*, which see for a statement of differences. It seems to be somewhat scarce and is very sparingly represented in collections.

157. ***Pachybrachys dilatatus*** Suffrian

Black, prothorax with sides and elytra with a large median subquadrate spot extending from the side margin two-thirds to suture, and an apical spot, red; prothorax finely rather sparsely

punctate, lustre dull; elytra semi-shining, more coarsely punctate, the punctures serially or subserially arranged except in a baso-sutural triangle. Ave. length 3.5 mm. Georgia.

Head moderately punctate, ocular lines wanting, eyes separated in the female by about twice the length of the basal antennal joint; antennae piceous to brownish yellow, base and apex darker.

Prothorax moderately transverse, widest and rather strongly rounded a little in advance of the base, punctuation rather fine and sparse, sides with red margin narrower behind.

Elytra robust, confusedly punctured baso-suturally, elsewhere with punctures arranged in lightly to moderately impressed lines, which are more or less sinuous or uneven medially; shield indistinct; marginal interspace punctured in basal half.

Legs black or nearly so throughout.

Length 3.7 mm.; width 2.1 mm.

Distribution.—*Georgia*: St. Catherine's Island, April 19 (Hubbard & Schwarz). Two females only have been seen in addition to the Suffrian type kindly loaned me by Dr. Taschenberg. The true *dilatatus* has hitherto remained completely unknown in American collections although the name has in numerous collections been applied to specimens of *subfasciatus*.

158. *Pachybrachys hepaticus* Melsheimer

Gray brown, yellow brown or brownish yellow, more or less obscurely maculate or clouded with darker brown or fuscous, a subapical sutural spot usually more or less conspicuous; integuments densely diffusely punctate but shining, elytra with a more or less distinct submarginal stria. Eyes small and very remote, front without ocular lines; antennae short; front thighs not stouter, tibiae completely unarmed at tip, front claws of male not at all larger than those of the middle and hind feet. Ave. length 2.5 mm. United States and southern Canada.

Head densely evenly punctate, eyes small, separated by one and one-half to two times their own vertical length, nearly as widely distant in the male as in the female. Antennae about half the length of the body in the male, scarcely passing the hind angles of the thorax in the female, tenth joint scarcely twice as long as wide.

Prothorax moderately transverse, sides moderately arcuately convergent from the base in the typical form, often widest more or less in front of the base in southern and western specimens; punctuation dense and evenly distributed, usually slightly sparser along the lateral margins; darker shadings obscure and indefinite.

Elytra more or less densely confusedly punctate, usually with a well defined submarginal stria which is more or less impressed and occasionally with a second fainter and incomplete stria interiorly adjacent; marginal interspace paler yellow without shading, and varying from impunctate to numerously punctured; shield wanting.

Pygidium variable in color, the tip often paler; body beneath dark brown, last ventral paler at sides; legs brownish yellow, the femora often with diffuse darker rings, tibiae dusky apically.

Length 1.9–3.4 mm.; width 1.5–1.9 mm.

Distribution.—Melsheimer's type was from Pennsylvania. The following localities are known to me or are reported on credible authority. *New Hampshire*: Farmington. *Massachusetts*: Wakefield, July 18. *Connecticut*: (Leng Coll.). *New York*: (Leng Coll.). *New Jersey*: Delaware Water Gap (Liebeck); Angelsea, July 5 (Wenzel). *Georgia*: (Liebeck), (Nat. Mus. Coll.); Tybee Island, June 29 (Wenzel). *Florida*: (Liebeck Coll.); Cedar Keys, June 6 (Hubbard & Schwarz); Jacksonville (Van Dyke Coll.). *Alabama*: Oak Grove July 21 (Loding). *Louisiana*: New Orleans, June 13 (Soltan Coll.). *Ohio*: Cincinnati (Dury). *Michigan*: Detroit, Monroe, and Marquette, Aug. 1, (Hubbard & Schwarz). *Wisconsin*: Bayfield (Wickham). *Canada*: Montreal, May 24 (Liebeck Coll.); Toronto (Crew); Scotia Junction, July 27 (Wenzel); Brandon, Manitoba (Wickham). *Kansas*: Salina (Knaus). *Texas*: Luling; Columbus, May 18 (Hubbard & Schwarz); Flatonia July 30 (Wenzel); Brownsville, May 23 (H. S. Barber), (Schaeffer); "Tex" (Nat. Mus. & Snow Coll.). *Colorado*: Gunnison (Baker); Ft. Collins, July 4 (Wickham); Colorado Springs, June 15 (Wickham); Denver, Oct. 20 (Soltan); Lorimer Co. (Leng Coll.); "Col" (Snow). *Wyoming*: Owl Creek, Aug. 29 (Currie—Nat. Mus. Coll.). *Utah*: Salt Lake, June 13 (Hubbard & Schwarz). *New Mexico*: Silver City (Dury); near Las Vegas Hot Springs (Snow); S. W. Truchas Peak above timber line, Aug. 4 (Cockerell). *Arizona*: Pearce, May 18 (Clemence); Santa Rita Mountains, May 6 (Hubbard & Schwarz); Globe (Wickham); Huachuca Mountains, July 4 (Wenzel); "Ari" (Morrison), (Liebeck). *California*: Santa Cruz, July 30; Monterey, July 12 (Schwarz); Tehachapi (Wickham); Los Angeles (Horn Coll.); Los Angeles Co. (Van Dyke), (Coquillett).

The most widely distributed species in our fauna. It occurs in almost every part of the United States and extends—I know not how far—into Mexico. Specimens in the Nat. Mus. Coll. labeled *pinguis* Suffr. by Mr. Schwarz and doubtless correctly so, are not different from some of our own which there seems to be no reason to hold as distinct from *hepaticus*. Practically every detail of structure, sculpture and color is more or less variable but the larger material one has to work with, the more difficult it becomes to draw any lines that will serve to separate varieties or races, and in only a single instance have I thought it worth while to do so. In its unincrassate anterior femora and entire absence of tibial spurs *hepaticus* agrees with *microps* alone among our species, and these two may be regarded on this account as deserving of subgeneric separation, but scarcely more than that I think, for these structures are not entirely constant elsewhere in the genus. The antennae are exceptionally short, nearly as in

microps though rather less incrassate apically. The maculation of the head and prothorax is nearly always very vague, but on the elytra varies from distinctly and rather sharply defined to almost entirely wanting. It consists here of a series of spots or clouds extending along and interiorly adjacent to the lateral stria and within these a discal series or group usually more or less indefinite in outline and often suffusedly confluent. The tip of the humeral umbo is almost always dark and a common sub-apical sutural spot is rarely lacking. The relative dimensions of the tarsal joints show a considerable amount of variation, the basal joint of the front tarsi—e. g.—being distinctly longer than wide, the terminal joint not or but slightly longer than the basal one in eastern specimens, while in some examples (not all) from California and Arizona the basal joint is as wide as or even wider than long, and the terminal joint is as long as the first two joints combined. This disparity, however, seems gradational and I have not as yet been able to base a separation on it.

The following form or variety seems sufficiently well marked to merit a name and may indeed be specifically distinct.

Var. ***heteroderus*** new variety

Larger than average *hepaticus*, head and prothorax brown, elytra dull ochreous, thickly brown punctate, with a dark brown stripe consisting of the fused lateral spots along the submarginal stria, the submarginal interspace clear ochreous and more convex; a common sutural spot. Prothorax inflated and widest at or slightly in advance of the middle; very densely punctate to the extreme margin, the punctures a little coarser than on the elytra. Basal joint of front tarsi as wide as long, the claw joint subequal in length to the basal two joints.

Length 2.7 to 3.7 mm.; width 1.4 to 2 mm.

Distribution.—*Arizona*: Peach Springs, Aug. 25, collected by Wickham, type female; Prescott (Van Dyke Coll.).

The form of the prothorax is quite remarkable and constitutes the chief distinguishing character of this form. There is a certain amount of instability in prothoracic outline in the series of *hepaticus* at hand, but nothing that approaches very closely to the present extreme.

159. ***Pachybrachys microps*** new species

Black, with a few very small barely detectable obscure rufous spots or shades near the margins of the prothorax and elytra; punctuation throughout extremely dense but not very coarse,

uniformly diffused without trace of serial arrangement at any part; lustre dull; eyes small, very remote, front without ocular lines; front thighs not stouter, all the tibiae without apical spurs, front claws of male not enlarged. Ave. length 3.4 mm. Arizona.

Head evenly very densely punctate, one or two minute obscure rufous flecks. Eyes very small, separated by rather more than twice their vertical length in the male. Antennae short, subclavate, black, brownish rufous toward the base, barely or scarcely half the length of the body (σ^7), tenth joint less than twice as long as wide.

Prothorax moderately transverse, somewhat narrowed in front, sides broadly arcuate.

Elytra uniformly very densely punctate throughout, the narrow interspaces between the punctures finely wrinkled.

Femora black, tibiae and tarsi brownish.

Length 2.9 to 3.35 mm.; width 1.45 to 1.85 mm.

Distribution.—*Arizona*: Santa Rita Mountains, May 30 (Hubbard & Schwarz), type male in Nat. Mus. Coll.; Williams (Wickham).

Two males only of this remarkable species have been seen. It is most nearly related to *hepaticus*, with which it agrees in its small very distant eyes and crural structure, and which is not unlike it in its short feebly incrassate antennae.

Biological Notes

Very little is known, or at least published, concerning the food plants, habits, etc., of our species of *Pachybrachys*. An appeal to Mr. Schwarz for any data known to him or possessed by the Bureau of Entomology at Washington, brought the following reply. "The species of *Pachybrachys* are so troublesome because most of our eastern species, and apparently also many of our western ones, do not appear to have any definite food plant in the imago state, and because their larvae (which unquestionably are all sac-bearers) are so difficult to find, and do not feed upon the foliage of plants. In fact Mr. Barber and myself have bred only a single species, *P. tridens*, from larvae found crawling under old leaves on the ground. The imago of *P. tridens* is also the only eastern species which seems to have a definite food plant, viz.—*Rhus toxicodendron*. Some of the larger species found by Barber and Schwarz at Williams, Ariz., occurred exclusively on *Pinus engelmanni*, and some of the smaller species from the desert region of Arizona have also definite food plants, but I failed to obtain the names of these plants from the poor specimens I gathered.

There are no biological notes on this genus at the Bureau of Entomology in Washington, none of the species having ever acquired an economic importance."

Among the thousands of specimens sent me for study, there are occasional examples bearing the name of the plant on which they were found. These may signify much, or little, as the case may be; I give them, however, for what they are worth. To these I add such published records of habits or occurrence as seem fairly reliable, but it is probable that some of these are based on erroneous identifications. For convenience of reference the species are arranged in alphabetical order.

1875. On *Ceanothus*, Smith, Ins. of New Jersey; it is doubtful if the species observed was the true *C. ciliatus*. Occurs on the foliage of the greater-rose-haw, and other plants. Blatchley—writing of *C. ciliatus*.
1875. On willow. Van Dyke—on leaves of sycamore and grass in low marsh localities. Blatchley. I have many times beaten the species from willows in southern Calif. nia.
1875. On gooseberry at Williams, Arizona. Barber & Schwarz.
1875. On *Arctostaphylos*. Hubbard & Schwarz.
1875. On Bear-oak and sweeping herbage. Blatchley.
1875. On sweeping herbage near margin of cypress swamp. Blatchley.
1875. On *Ceanothus*. Hallenmaier, plenty in fruit. On oak at Mobile, Alabama. L. Ingr.
- Var. *sp. n.* On Bear-oak at Framingham, Mass. Frost.
1875. On *Pisonia* at Williams, Arizona. Barber and Schwarz.
1875. On wild rose, Mar. C., Calif. nia. Van Dyke.
1875. On *Sida*. LeConte.
1875. On *Erythrina* at *id.* Blatchley; on *Ceanothus* at *id.*, and on *Erythrina* at *id.* Woodruff.
1875. On *Ceanothus*. Van Dyke.
1875. On willows at San José, Calif. nia. Mrs. A. C. Bush—Nat. Mus. Coll.
1875. On "Sweeping herbage."
1875. On *Pisonia* at Williams, Arizona. Barber & Schwarz.
1875. On black locust, Central Missouri. C. V. Riley—Nat. Mus. Coll.
1875. On sweeping herbage. Blatchley; on *Ceanothus* sp. and on *Fuchsia* at *id.* at Littlefield, Connecticut. Woodruff.
1875. On *Pisonia* (sp. n.), Long Island, New York. Woodruff. On flowers of *Rosa* at *id.*—also sweeping grass. Frost.
1875. On Bear-oak from hazel. Blatchley.
1875. On *Prinos* of *Paso*, Death Valley, California. K. Kober.
1875. On *Quercus* at *id.* near New York City. Woodruff. On flowers of white hydrangea and Jersey Tea. *Ceanothus*. Blatchley—*sp. n. n.*
1875. On black locust, Central Missouri. C. V. Riley—Nat. Mus. Coll.
1875. On sweeping herbage in low places. Blatchley.

with the *Pachybrachys* of the Tertiary of the United States. *Proc. Acad. Nat. Sci. Phila.*, 1881, p. 107. (See also *Trans. Am. Ent. Soc. Phila.*, 1882, p. 107.)
 10. *Pachybrachys* of the Pliocene of the United States. *Ann. Ent. Soc. Amer.*, 1912, p. 117. (See also *Trans. Am. Ent. Soc. Phila.*, 1912, p. 117.)
 11. *Pachybrachys* of the Pliocene of the United States. *Trans. Am. Ent. Soc. Phila.*, 1912, p. 117. (See also *Ann. Ent. Soc. Amer.*, 1912, p. 117.)

Bibliography

No effort has been made to make this bibliography complete, but it will, I think, be useful to include a few of the useful references. So many of the illustrations and descriptions are based on erroneous determinations or are so highly suspicious that I have even hesitated about giving any names rather than original references.

The following three papers are all that have attempted to deal with our North American fauna in a systematic manner.

Haldeman. *Journ. Acad. Nat. Sci. Phila.*, 2d series, 1846, pp. 257-263.

Suffrian. *Linn. Ent.*, vii, 1846, pp. 148-248.

L-Coquer. *Trans. Am. Ent. Soc. Phila.*, vi, 1881, pp. 217-219.

PACHYBRACHYS (gen. n.)

Diagn. Gen. n. Ent., 1884.

1. *Pachybrachys* of the Pliocene of the United States. *Ann. Ent. Soc. Amer.*, 1912, p. 117. (See also *Trans. Am. Ent. Soc. Phila.*, 1912, p. 117.)
2. *Pachybrachys* of the Pliocene of the United States. *Trans. Am. Ent. Soc. Phila.*, 1912, p. 117. (See also *Ann. Ent. Soc. Amer.*, 1912, p. 117.)
3. *Pachybrachys* of the Pliocene of the United States. *Ann. Ent. Soc. Amer.*, 1912, p. 117. (See also *Trans. Am. Ent. Soc. Phila.*, 1912, p. 117.)
4. *Pachybrachys* of the Pliocene of the United States. *Ann. Ent. Soc. Amer.*, 1912, p. 117. (See also *Trans. Am. Ent. Soc. Phila.*, 1912, p. 117.)
5. *Pachybrachys* of the Pliocene of the United States. *Ann. Ent. Soc. Amer.*, 1912, p. 117. (See also *Trans. Am. Ent. Soc. Phila.*, 1912, p. 117.)
6. *Pachybrachys* of the Pliocene of the United States. *Ann. Ent. Soc. Amer.*, 1912, p. 117. (See also *Trans. Am. Ent. Soc. Phila.*, 1912, p. 117.)
7. *Pachybrachys* of the Pliocene of the United States. *Ann. Ent. Soc. Amer.*, 1912, p. 117. (See also *Trans. Am. Ent. Soc. Phila.*, 1912, p. 117.)
8. *Pachybrachys* of the Pliocene of the United States. *Ann. Ent. Soc. Amer.*, 1912, p. 117. (See also *Trans. Am. Ent. Soc. Phila.*, 1912, p. 117.)
9. *Pachybrachys* of the Pliocene of the United States. *Ann. Ent. Soc. Amer.*, 1912, p. 117. (See also *Trans. Am. Ent. Soc. Phila.*, 1912, p. 117.)
10. *Pachybrachys* of the Pliocene of the United States. *Ann. Ent. Soc. Amer.*, 1912, p. 117. (See also *Trans. Am. Ent. Soc. Phila.*, 1912, p. 117.)
11. *Pachybrachys* of the Pliocene of the United States. *Ann. Ent. Soc. Amer.*, 1912, p. 117. (See also *Trans. Am. Ent. Soc. Phila.*, 1912, p. 117.)

12. *P. douneri* Crotch, Trans. Am. Ent. Soc., v, p. 78; LeConte, loc. cit., p. 205.
13. *P. ulcanus* n. sp.
14. *P. brunneus* Bowd., Can. Ent., xli, p. 238.
15. *P. purus* n. sp.
16. *P. mellitus* Bowd., Can. Ent., xli, p. 241.
17. *P. xantholuccus* n. sp.
18. *P. jacobyi* Bowd., Can. Ent., xli, p. 240.
19. *P. densus* Bowd., Ibid., p. 242.
20. *P. immaculatus* Jac., Biol. Cent.-Amer., Coleop., vi., Part i. Suppl., p. 148.
21. *P. insidiosus* n. sp.
22. *P. marginipennis* Bowd., Can. Ent., xli, p. 285.
23. *P. punctatus* Bowd., Ibid., p. 285.
var. *shasta* Bowd., Can. Ent., xlii, p. 56.
24. *P. convictus* n. sp.
25. *P. arizonensis* Bowd., Can. Ent., xli, p. 286.
26. *P. lodingi* Bowd., Ibid., p. 243.
27. *P. placidus* n. sp.
28. *P. liveus* Lec., Proc. Acad. Nat. Sci. Phila., 1858, p. 84.
29. *P. mercurialis* n. sp.
30. *P. parvicolatus* n. sp.
31. *P. mitis* n. sp.
32. *P. coloradensis* Bowd., Can. Ent., xli, p. 242.
serier Bowd., Ibid., p. 315.
33. *P. minor* Bowd., Ibid., p. 243.
34. *P. nero* Bowd., Ibid., p. 315.
35. *P. petronius* n. sp.
36. *P. laticus* n. sp.
37. *P. abdominalis* Say (*Cryptocephalus*), Jour. Acad. Nat. Sci. Phila., iii, p. 437; Hald., loc. cit., p. 263; Suffr., loc. cit., p. 211; Blatchley, Coleop. Indiana, p. 1129 (probably an error in identification).
38. *P. diversus* n. sp.
39. *P. pusillus* Bowd., Can. Ent., xli, p. 317.
40. *P. macronychus* n. sp.
41. *P. crassus* Bowd., Can. Ent., xli, p. 290.
42. *P. longus* Bowd., Ibid., p. 313.
43. *P. bullatus* n. sp.
44. *P. texanus* Bowd., Can. Ent., xli, p. 316.
45. *P. uncinatus* n. sp.
46. *P. pectoralis* Melsh (*Cryptocephalus*), Proc. Acad. Nat. Sci. Phila., iii, p. 171; Hald., loc. cit., p. 263; Suffr., loc. cit., p. 187.
47. *P. sobrinus* Hald., loc. cit., p. 262.
pectoralis† Suffr., loc. cit., p. 187.
oculatus Suffr.? loc. cit., p. 178.
sticticus Blatchley, Coleop. Indiana, p. 1130.
48. *P. contractifrons* n. sp.
49. *P. alacris* n. sp.

50. *P. chaoticus* n. sp.
 51. *P. pellatus* n. sp.
 52. *P. peninsularis* n. sp.
 53. *P. turgidicollis* n. sp.
 54. *P. illectus* n. sp.
 55. *P. proximus* Bowd., Can. Ent., xli, p. 313.
 56. *P. unnenmacheri* n. sp.
 57. *P. fortis* n. sp.
 58. *P. femoratus* Oliv. (*Cryptoccephalus*), Ent., vi, p. 810, n. 44, tab. v, fig. 78; Hald., loc. cit., p. 261; Suffr., loc. cit., p. 173; LeConte, loc. cit., p. 208; Blatchley, Coleop. Indiana, p. 1131.
sparsus Newm. (*Cryptoccephalus*), Entomologist, 1841, p. 78.
 var. *aquilonis* n. var.
 59. *P. characteristicus* Suffr., loc. cit., p. 176, Bowditch, Ent. News, xix, p. 217.
 60. *P. subfasciatus* Lec., Ann. Lyc. Nat. Hist. N. Y., i, p. 173, pl. xi, fig. 20; Hald., loc. cit., p. 260; Suffr., loc. cit., p. 166; LeConte, loc. cit., p. 209; Blatchley, Coleop. Indiana, p. 1130.
 61. *P. impurus* Suffr., loc. cit., p. 186; Bowditch, Ent. News, xix, p. 217.
 var. *xanthias* Suffr., loc. cit., p. 199; Linn. Ent., xii, p. 404.
 var. *umbrosus* n. var.
 62. *P. calidus* n. sp.
 63. *P. brevicornis* n. sp.
 64. *P. prosopis* n. sp.
 65. *P. wenzeli* n. sp.
 66. *P. snowi* Bowd., Can. Ent., xli, p. 290.
 67. *P. turbidus* Lec., loc. cit., p. 208.
 68. *P. laticollis*, Jac., Biol. Cent.-Amer., Coleop., vi, Part i, p. 72, plate iv, fig. 16; also Suppl., p. 149.
 69. *P. duryi* n. sp.
 70. *P. gracilipes* n. sp.
 71. *P. confederatus* n. sp.
 72. *P. tybecensis* n. sp.
 73. *P. calcivatus* n. sp.
 74. *P. cylindricus* Bowd., Can. Ent., xli, p. 291.
 75. *P. notatus* Bowd., Can. Ent., xlii, p. 53.
 76. *P. caelatus* Lec. Proc. Acad. Nat. Sci. Phila., 1858, p. 84.
 77. *P. brevicollis* Lec., loc. cit., p. 208.
 78. *P. nubigenus* n. sp.
 79. *P. puniceus* n. sp.
 80. *P. melanostictus* Suffr., loc. cit., p. 191; Linn. Ent., xii, p. 403.
 81. *P. piceus* Suffr., loc. cit., p. 192; Bowditch, Ent. News, xix, p. 217; Blatchley, Coleop. Indiana, p. 1131.
 82. *P. signatifrons* Mann., Bull. Soc. Nat. Mose., ii, p. 311; Suffr., loc. cit., p. 167; Linn. Ent., xii, p. 401.
 83. *P. signatus* Bowd., Can. Ent., xli, p. 288.

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85. *P. vacillatus* n. sp.
86. *P. badius* n. sp.
87. *P. quadratus* n. sp.
88. *P. mobilis* n. sp.
89. *P. delumbis* n. sp.
90. *P. pluripunctatus* n. sp.
91. *P. bajulus* Suffr., loc. cit., p. 175; Jac., Biol. Cent.-Amer., Coleop., vi, Part i, p. 66; also Suppl., p. 137.
92. *P. nobilis* n. sp.
93. *P. fuscipes* n. sp.
var. *purgatus* n. var.
94. *P. sanrita* Bowd., loc. cit., p. 289.
95. *P. atomarius* Melsh. (*Cryptoccephalus*), Proc. Acad. Nat. Sci. Phila., iii, p. 170; Suffr., loc. cit., p. 171; Blatchley, Coleop. Indiana, p. 1129.
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atomus Bowd., Can. Ent., xli, p. 319.
96. *P. vestigialis* n. sp.
97. *P. obfuscatus* n. sp.
98. *P. stygicus* n. sp.
99. *P. lachrymosus* n. sp.
100. *P. cephalicus* n. sp.
var. *dixianus* n. var.
var. *parvus* n. var.
101. *P. roboris* n. sp.
102. *P. spunarius* Suffr., loc. cit., p. 179; Bowditch, Ent. News, xix, p. 217; Blatchley, Coleop. Indiana, p. 1132 (perhaps wrongly identified).
103. *P. relictus* n. sp.
104. *P. carolinensis* Bowd., Can. Ent., xlii, p. 55.
105. *P. luctuosus* Suffr., Linn. Ent., xii, p. 401.
106. *P. varius* Bowd., Can. Ent., xli, p. 321.
107. *P. conformis* Suffr., loc. cit., p. 205.
108. *P. osccola* n. sp.
109. *P. quadri-oculatus* n. sp.
110. *P. fractus* n. sp.
111. *P. truncatus* Bowd., Can. Ent., xli, p. 314.
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114. *P. croftus* Bowd., Can. Ent., xli, p. 322.
115. *P. sonorensis* Jac., Biol. Cent.-Amer., Coleop., vi, Pt. i, Suppl., p. 151.
116. *P. varicolor* Suffr., loc. cit., p. 153; Jac., Biol. Cent.-Amer., Coleop., vi, Pt. i, p. 65, also Suppl., p. 137.
renidens Lec., loc. cit., p. 208.
laevicollis Bowd., Can. Ent., xli, p. 322.
117. *P. lustrans* Lec., loc. cit., p. 208.
118. *P. californicus* n. sp.
var. *gagates* n. var.

119. *P. pingucscens* n. sp.
120. *P. tridens* Melsh. (*Cryptocephalus*), Proc. Acad. Nat. Sci. Phila., iii, p. 172; Hald., loc. cit., p. 257 (not *tridens* Melsh.); Suffr., loc. cit., p. 184; LeConte, loc. cit., p. 207; Blatchley, Coleop. Indiana, p. 1129.
mollis Hald., loc. cit., p. 263; Suffr., loc. cit., p. 226.
var. *flavicornis* Melsh., loc. cit., p. 172; Hald., loc. cit., p. 261; Suffr., loc. cit., p. 226.
121. *P. obsoletus* Suffr., loc. cit., p. 200.
122. *P. alticola* n. sp.
123. *P. lacris* Bowd., Can. Ent., xli, p. 316.
124. *P. nubilus* Bowd., Ibid., p. 312.
125. *P. conspirator* n. sp.
126. *P. subvittatus* Lec., loc. cit., p. 208.
127. *P. liebecki* n. sp.
128. *P. bivittatus* Say (*Cryptocephalus*), Jour. Acad. Nat. Sci. Phila., iii, p. 440; Am. Ent., pl. 28.; Hald., loc. cit., p. 259.
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abescens Suffr., Linn. Ent., xii, p. 404.
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130. *P. circumcinctus* Crotch, Trans. Am. Ent. Soc., 1874, p. 79.
131. *P. consimilis* n. sp.
132. *P. litigiosus* Suffr., loc. cit., p. 217; Linn. Ent., xii, p. 408 (probably not the true *litigiosus*); LeConte, loc. cit., p. 205; Blatchley, Coleop. Indiana, p. 1127 (probably in error).
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134. *P. dubiosus* Lec., loc. cit., p. 206.
135. *P. purnee* n. sp.
136. *P. vau* n. sp.
137. *P. umbraculatus* Suffr., loc. cit., p. 213; Jac., Biol. Cent.-Amer., Coleop., pt. i, p. 69, plate iv, fig. 14; Suppl., p. 143.
138. *P. pallidipennis* Suffr., Linn. Ent., xii, p. 406; Bowditch, Can Ent., xix, p. 217.
striatus Lec., loc. cit., p. 205.
139. *P. othonus* Say (*Cryptocephalus*), Am. Ent., ii, pl. 2; Hald., loc. cit., p. 263; Suffr., loc. cit., p. 219; LeConte, loc. cit., p. 206; Blatchley, Coleop. Indiana, p. 1128.
marginalicollis Rand., Bost. Jour. Nat. Hist., ii, p. 46; Suffr., loc. cit., p. 228.
140. *P. praeclarus* Weise, Wien. Ent. Zeit., 1913, p. 219.
degans † Blatch., loc. cit., p. 1127.
141. *P. autolyceus* n. sp.
var. *difficilis* n. var.
var. *wahsatchensis* n. var.
142. *P. nigricornis* Say (*Cryptocephalus*), Jour. Acad. Nat. Sci. Phila., iii, p. 436; Suffr., loc. cit., p. 161.

143. *P. carbonarius* Hald., loc. cit., p. 260; Suffr., loc. cit., p. 159; LeConte, loc. cit., p. 207; Blatchley, Coleop. Indiana, p. 1127.
var. *janus* n. var.
144. *P. picturatus* Germ. (*Cryptocephalus*), Ins. nov., p. 560; Suffr., loc. cit., p. 209.
145. *P. viduatus* Fab. (*Cryptocephalus*), Syst. Eleuth., ii, p. 49; Hald., loc. cit., p. 259 (doubtless in error); Suffr., loc. cit., p. 154; LeConte, loc. cit., p. 206=*birittatus* Say; Bowditch, Can Ent., xix, p. 217.
146. *P. m-nigrum* Melsh. (*Cryptocephalus*), Proc. Acad. Nat. Sci. Phila., iii, p. 170; Hald., loc. cit., p. 261; Blatchley, Coleop. Indiana, p. 1128.
intricatus Suffr., loc. cit., p. 180; LeConte, loc. cit., p. 207.
147. *P. trinotatus* Melsh. (*Cryptocephalus*), ibid., p. 170; Hald., loc. cit., p. 164; Suffr., loc. cit., p. 164; LeConte, loc. cit., p. 207; Blatchley, Coleop. Indiana, p. 1128.
148. *P. pulvinatus* Suffr., loc. cit., p. 151.
149. *P. confusus* Bowd., Can. Ent., xli, p. 365 (*proximus* || p. 320).
150. *P. luridus* Fab. (*Cryptocephalus*), Suppl. Ent. Syst., p. 109; Syst. Eleuth., ii, p. 45; Hald., loc. cit., p. 261; LeConte, loc. cit., p. 208; Blatchley, Coleop. Indiana, p. 1130.
femoratus Say (*Cryptocephalus*), Jour. Acad. Nat. Sci. Phila., iii, p. 440.
aesculi Melsh. (*Cryptocephalus*), Proc. Acad. Nat. Sci. Phila., iii, p. 171.
moerens Stal. Oefv. Kongl. Vet. Ak. Foerh., xiv, 1857, p. 63.
var. *nigrinus* Blatch., loc. cit., p. 1130.
var. *festivus* n. var.
151. *P. vulnerosus* n. sp.
152. *P. instabilis* n. sp.
153. *P. hybridus* Suffr., loc. cit., p. 157; LeConte, loc. cit., p. 206.
154. *P. discoideus* Bowd., Can. Ent., xli, p. 239.
limbatus || (*Cryptocephalus*), Newm., Mag. Nat. Hist., iv, p. 250; Hald., loc. cit., p. 258; Suffr., loc. cit., p. 226; LeConte, loc. cit., p. 206.
155. *P. marginatus* Bowd., Can. Ent., xli., p. 239.
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157. *P. dilatatus* Suffr., loc. cit., p. 162; LeConte, loc. cit., p. 209; Blatchley, Coleop. Indiana, p. 1131 (= *subfasciatus* Lec.).
158. *P. hepaticus* Melsh. (*Cryptocephalus*), Proc. Acad. Nat. Sci. Phila., iii, p. 171; Hald., loc. cit., p. 257; Suffr., loc. cit., p. 223; LeConte, loc. cit., p. 209; Blatchley, Coleop. Indiana, p. 1130.
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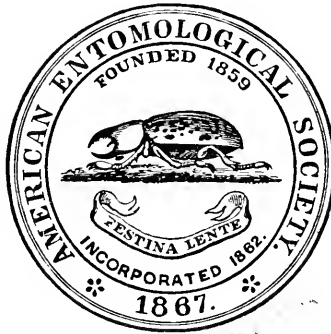
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PHILADELPHIA

SUBSCRIPTION PRICE FOUR DOLLARS PER VOLUME

NOTES ON SOME SOUTH AMERICAN HALTICIDAE

BY F. C. BOWDITCH

The Monoplatid division of the "Oedipodes" originally monographed by Mr. Hamlet Clark in 1860 has received since then comparatively scant attention. Von Harold and the late Mr. Jacoby have both described some forms and both commented on Mr. Clark's paper and the difficulties of determining to which section certain forms might belong. Other authors have added a few scattered species. About half of Clark's and Harold's and nearly all of Jacoby's species are represented in my collection. Very many unnamed forms are present, the most striking of which I have given names to in hopes of drawing attention to this neglected tribe. Some of my species will later go into new genera, but rather than increase the genera (where there is already so much uncertainty), I have considered it better to squeeze them into existing groups until more specimens are at hand and further study made.

Mr. Jacoby¹ puts *Homotyphus* and *Omototus* together under the former name. It seems probable that Clark found difficulty in his separation because in his work, page 124, he refers to *H. tuberculatus*, meaning apparently *O. tuberculatus*, page 211, and on page 212 he refers to *O. fuliginosus* meaning *H. fuliginosus*, page 174; a possible explanation being that after writing the paper referring to the forms as above he shifted *fuliginosus* from *Omototus* to *Homotyphus* and *tuberculatus* from *Homotyphus* to *Omototus* and forgot to alter the text. At all events this supposition seems reasonable and makes his references easily understood.

Mr. Jacoby's three species of *Omototus*, i. e., *quadri-plagiatus*, *rubripennis* and *rufolimbatus* differ in general facies entirely from many of the species of *Homotyphus* and the same may be said of my *iridipennis* and *rosenbergii*, especially the latter. *Homotyphus* (*Omotyphus*) *carinatus* Jacoby² should be changed to *jacobyi* as the former name was previously used by Jacoby for a species from San Esteban.

¹ Biol. Cent.-Amer., Coleopt., vi, pt. I, p. 170.

² Biol. Cent.-Amer., Coleopt, vi, Suppl., p. 323.

The types of all the forms herein described are in my collection.

Rhinotmetus similis nov. sp.

Usual elongate form; head, thorax and feet more or less rufous, elytra blue black, with fine punctures arranged as striae, flavous pubescent, a basal and submedian spot on each elytron denuded and shining.

Type.—Merida, Venezuela (No. 398 green label). Second Jac. coll. Length 5.5 mm.

Head with a longitudinal carina extending from the middle of the clypeus up between the antennae, ending just above their insertion in a fine cross groove, above which is a pair of longitudinal frontal tubercles, and then a fine carina extending as far as the rear margin of the head, the rear part of which is granulate, strigose, suffused with black; antennae filiform, extending to the middle of elytra, black, the first four joints and the apical one suffused rufous, thorax in the usual form of this genus, much narrowed, rounded and depressed in front; also obsoletely, longitudinally channeled, very obsoletely punctulate behind at the angles and sparsely flavous pubescent; rufous, suffused down the middle with blackish; scutellum fuscous rufous, elytral punctures, well defined at base, entirely obsolete behind, an antemedian depression which is obsolete at the suture but well marked where it curls up by the shoulder, gives the appearance of a raised callous to the scutellar area; in the specimen before me the rear denuded spot attains the margin, but it is probable that in fresh, perfect examples the pubescence covers the lateral edge, feet rufous with tibiae and tarsi more or less black, claws bifid.

This species belongs near *leptocephalus* Perty, but is much smaller.

Rhinotmetus trifasciata nov. sp.

Usual elongate form, head, thorax and feet more or less bright flavous yellow, elytra shining blue black with three transverse bands of flavous pubescence, ante and post median and apical, the former with a branch encircling the shoulder and all attaining the margin, the suture also narrowly pubescent.

Type.—Cachabá, Ecuador; low c., I, 1897. (Rosenberg). Length 6 mm.

Head sparsely flavous pubescent, more thickly round the eyes, anteriorly flavous, becoming dark rufous towards the rear, clypeus wide, shining, tricarinate, broadly foveate on either side, the median carina continuing between the antennae, when it parts into a Y frontal fovea, forming two smooth oblique tubercles, rear portion of the head rough, strigose with fine punctures and finely carinate nearly to the base, antennae black, filiform, short, reaching only slightly below the elytral base; thorax shaped as usual in this genus, rounded

in front, margined, slightly transversely depressed behind; bright yellow, clothed with fulvous pubescence, scutellum fulvous; elytra punctate striate, well marked near the shoulders, faint on the disk and obsolete at the rear, a faint depression gives prominence to the scutellar region, in addition to the yellowish pubescence, the surface is sparsely sprinkled with long upright hairs in longitudinal lines; body beneath dark rufous, legs bright yellow with tibiae and tarsi very dark rufous, claws bifid.

Belongs near *leptoccephalus* Perty.

Rhinotmetus marginatus nov. sp.

Usual elongate form, head black, thorax yellow, elytra blue black, shining, suture and apex narrowly margined with yellow pubescence, legs yellow, tarsi and tibiae more or less rufous.

Type.—Rio Janeiro, Brazil. Length 5 mm.

Head produced in front, very sparsely pubescent, clypeus broadly foveate on each side, with a median carina which ends between the antennae in a frontal Y fovea, forming two smooth slightly oblique tubercles which end about the middle of the eye, back of that the surface is closely rugose striate with a fine smooth median carina which nearly reaches the base, antennae short, dark, rufous at base (missing after the seventh joint); thorax very finely punctulate and sparsely flavous pubescent, anteriorly compressed and depressed as usual in the genus, also transversely depressed behind, sides margined, subparallel behind and (viewed from behind) showing a faint angulation just below the middle; scutellum dark rufous; elytra, with a faint antemedian depression, which becomes well marked when it curves up to the base by the shoulders, punctate striate, at base and sides, becoming obsolete behind, interspaces very minutely alutaceous, with long hairs sparsely arranged in longitudinal lines, body beneath blue black, anterior tibiae and tarsi more or less suffused with dark rufous, claws bifid.

By its color it should be placed near *sulcicollis* Clark, but none of his species have the suture pubescent.

Rhinotmetus jacobyi nov. sp.

Usual form, head blackish rufous, thorax yellow, finely pubescent, elytra black, deeply punctate striate, with a faint stripe of yellowish pubescence, from the humerus obliquely to the suture, following that until it reaches the declivity at the rear, thence curving in a semicircle to the apex, having a common rounded ante-apical bare spot, body below and feet yellow.

Type.—Sta. Catharina, Brazil. Length 4 mm.

Clypeus smooth, shiny, with a strong median carina, ending between the eyes in a Y fovea which makes two smooth frontal tubercles, rear of the head closely rugosely punctate, tricarinate, the median reaching the base and the others parallel to the eyes; the clypeus and tubercles are noticeably rufous;

antennae reaching below the middle of the elytra, (eleventh joint missing) black, three basal joints rufous, the rest much elongate and transversely dilated, thorax the usual form for the genus, slightly depressed transversely behind and longitudinally in front at the middle, the surface dull with fine punctures and yellow pubescence; scutellum dark fuscous; elytra deeply punctate striate, becoming obsolete at apex, very lightly depressed before the middle, the depression being slightly deeper at the shoulders, thus bringing out the scutellar area, the elytra seem to be lightly pubescent everywhere except the spot at the apex and the linear effect above spoken of is somewhat one of light and shade, and is shown best when the specimen is viewed squarely from above; also, especially at the sides, are a few scattered hairs arranged longitudinally; body below and legs yellow, claws bifid.

The differently shaped antennae might throw this form into some other place, but the shape of the thorax, etc., impels me to keep it here; *parvulus* Jac. has very transversely broad antennal joints.

Rhinotmetus bruchii nov. sp.

Oblong, rather depressed, head, thorax, body beneath and legs dull yellow, elytra ferruginous, with narrow antemedian and postmedian transverse bands of dark pubescence and scattered longitudinal markings of gray pubescence.

Type.—Province of Buenos Aires, Argentine. (C. Bruch.)
Length 2.5 mm.

Head not produced anteriorly, front and rear closely and finely punctured and with two small smooth tubercles, just back of the antennae, which latter are short and stout, joints six to eleven thickened and transverse, thorax semi-shining, with very fine punctures and minute pubescence, not as much narrowed and depressed anteriorly as in many of the Brazilian forms, still enough to bring it within the province of the genus, on each side back of the middle is an oblique shallow depression; scutellum flavous pubescent, elytra strongly punctate striate rather square across the shoulders and parallel sided, a faint antemedian depression bringing out the scutellar region; of the two dark bands the first is oblique forward, the second oblique backward tending to make a <> spot, the paler pubescence is mostly within the dark area. Claws appendiculate.

Seems to me near *minutus* Jac. by its antennae and claws.

The species was in the second Jacoby Coll. No. 28c and has been sent to me by Dr. Bruch; all the specimens I have seen have originated with him.

Tetragonotes rosenbergii nov. sp.

Elongate, flattened, narrowed posteriorly, black, labrum fulvous picous, sides of thorax, femora, (except the apex) the

hind tibiae and tarsi wholly, and the middle partly, yellow, elytra obsoletely on each edge about the middle and joints nine to eleven of the antennae fulvous, elytra dull with microscopic pubescence, only visibly punctate striate obsoletely at the base.

Type.—Cachabé, Ecuador; low c.; XII, 1896, (Rosenberg). Length 6 mm.

Clypeus with acute median carina, branching between the antennae into two shiny oblique knobs, vertex and neck finely strigose; thorax elongate, constricted in front so that the anterior angles are sub-prominent, sides margined, hardly subangulate before the middle, surface with a longitudinal median depression which is broad and well marked in front, obsolete behind, also an oblique depression on either side near the base, surface sparsely punctulate; scutell and elytral dull black, in certain light, traces of punctures arranged in striae can be seen at the base, but only with a strong glass can anything approaching striae be made out on the rest of the elytra, and then it takes a good imagination. The lateral edge is sharp and marked with a line of punctures; a needle point will make marks on the surface similar to a finger removing the bloom from a plum. Body beneath shining black, legs including the coxae and hind trochanters yellow, the anterior pair having the apex of the femora, tibia and tarsi black, the middle pair having the same parts dark but more or less rufous, and the hind pair having the apex of femora inky black; claws simple, hind tibia with a single excurved spine.

A very aberrant form; one of the characteristics of the group is punctate striate elytra and it is only by courtesy that this can be so called, otherwise it seems to fit fairly well; it has a general resemblance to *fasciaticollis* Jac. from Costa Rica.

One example.

Tetragonotes sericeus nov. sp.

Elongate, rufous; palpi, antennae except the last joint, the back part of the head and the scutellum black, body beneath and tarsi more or less dark rufous, the thorax and elytra clothed with very short golden pubescence.

Type.—Chaco, Bolivia (square green label). Length 6 mm.

Head with broad smooth clypeus, well carinated in the middle, frontal tubercles strong, smooth, rufous, the color extending in a smooth band to the eye, vertex and neck finely punctulate; antennae filiform reaching a little below the middle of the elytra, the seventh joint obviously dilated (a sex sign as in *Allochroma*?) last four joints shortened, the eleventh pale flavous; the thorax with the side angulation and anterior angles of *Tetragonotes* and the anterior compression of *Rhinolmetus*, a well marked median line, nearly the whole length, disk flattened anteriorly and with the rather obsolete fovea on either side just back of the middle, all the angles distinct; elytra with punctures

and stria almost entirely obscured by the pubescence, hind tibiae strongly curved—claws appendiculate.

As in *rosenbergii* it is difficult to distinguish the striae on the elytra.

One example.

Tetragonotes apicalis nov. sp.

Slender, elongate, head and thorax black, antennae black, joints ten to eleven flavous, elytra dull orange, a common elongate triangular spot at base, including the scutellum and coming to a fine point in the suture just back of the middle, and a common round apical spot, black, body beneath black, legs black, with the base of the femora and base of the hind tibia flavous.

Type.—Cochabamba, Bolivia. (Germ.) Length 5 mm.

Clypeus wide, with well developed medium carina, and two shining frontal tubercles between the eyes, vertex and neck dull, finely punctulate; antennae filiform, seventh joint somewhat broadened (sexual difference?); thorax much narrowed anteriorly but with distinct angles, all the angles minutely tipped with rufous, finely and distinctly margined at the base, distinctly depressed behind and at the sides, and broadly longitudinally sulcate, the sides making two rather prominent antemedian humps which are shiny, remainder of surface dull; elytra dull with short pubescence, black and yellow on their respective colors; body beneath shining black, all the femora yellow at base, also the hind tibiae remainder black; claws appendiculate.

As in *rosenbergii* the elytral striae are very vague.

One example.

Tetragonotes haroldi nov. sp.

Usual elongate form, bright honey yellow, paler beneath, eyes, tips of the mandibles, and joints three to nine of antennae rufous black, upper surface opaque with fine pubescence.

Type.—Cachabé, Ecuador; low e., XII, 1896, (Rosenberg). Length 4.5 mm.

Similar to the pale variety of *T. oculatus* Har. mentioned by Jacoby,³ and it will suffice to point out the differences. *Oculatus* is not a clear color, always muddy, the antennal joints are longer and extend well onto the hind thighs, whereas *haroldi* barely attain the middle of the elytra and the tibiae are not as curved as in *oculatus*, in this respect following *militaris* Har., *haroldi* also has the lateral edge of the elytra flatter, sharper and more earinate than *oculatus*.

³Biol. Cent.-Amer., Coleopt., vi, p. 457.

Tetragonotes carinipennis nov. sp.

Elongate, usual form, dull yellow, head and thorax suffused with rufous, antennae and tarsi dark rufous, elytra with a well marked carina from the shoulder to apex, becoming obsolete at tip, about ten long stiff upright hairs on each carina.

Type.—Cochabamba, Bolivia. (Germ.) Length 5 mm.

Head with broad clypeus and moderate median carina, prominent frontal tubercles and equate vertex; antennae long, filiform, lower joints shining, last four or five pubescent, reaching well towards the end of the elytra; thorax with the usual median depression and a rather well marked side depression in line with the angulation; elytra square shouldered, parallel sided and having on each side two obsolete sub-costae occupying the third and fifth interstices, the punctuation very fine and giving an opaque appearance, all the tibiae are strongly curved as in *oculatus* Har.; the carina on the elytra decorated with its long hairs makes this form easily recognized.

One example.

Tetragonotes truncatipennis nov. sp.

Elongate, testaceous yellow, antennae rufous, darkened towards the end, tibiae and tarsi clouded with rufous, the hind tibiae strongly curved, the anterior less so, elytra truncate with sharp sutural angles, hind femora obtusely, broadly toothed beneath.

Type.—Meridá, Venezuela. Length 7 mm.

Clypeus square, broad, with a well marked median and obsolete side carina, frontal tubercles large, smooth, inverted pear shaped, vertex and neck somewhat uneven and punctulate; antennae filiform, reaching nearly to middle of elytra, joints seven to twelve shortened, scape relatively long and stout; thorax in the regular form for the genus, shining, sparsely punctulate, depressed transversely behind, broadly and flatly down the middle, a distinct round foveate depression each side of the middle; elytra finely punctate striate, obsolete at apex, the interstices finely alutaceous.

The swollen last joint of the hind tarsi is only moderate and in relation to most of the species is analogous to that of *Homophocta* as compared to *Oedionychis*.

One example.

Physimerus spinosus nov. sp.

Olivaceous green, elytra strongly punctate striate, sparsely pubescent and with long erect hairs, body below yellowish, tinged with green, joints seven to eight of antennae black, femora of the anterior and middle legs strongly curved, the former with

two small acute teeth, one being on the trochanter joint, the other alongside on the base of the femora, middle of hind tibiae below with a long acute backward curved, spinous process.

Type.—Cachabé, Ecuador; low c., XII, 1896, (Rosenberg). Length 3.5 mm.

Head vertical, with well marked frontal tubercles and a wide fovea, the vertex with an obsolete smooth longitudinal carina; antennae reach below the middle of the elytra; thorax elongate, quadrate, slightly constricted at rear, with transverse, and oblique, side basal depressions, the latter well marked, also a medium longitudinal fovea in front which in connection with the oblique depressions brings out two well marked median calli; scutellum fulvous; elytra with striae obsolete at tip, the lateral margin sharp and well defined, no visible basal depression though the scutellar callous is obsolete raised; the curvature of the anterior femora is very strong at the basal half, the hind tibial spur is sharply pointed, broad and stout at base and abruptly curved backward.

The structure of the legs might easily put this species in a new genus, but both sexes ought to be in hand before it is done.

One example.

Phylacticus ephippium nov. sp.

Elongate, fulvous yellow, thorax with sides broadly black, elytra punctate striate, obsolete so at apex, finely pubescent, a sub-basal and sub-median band, black, connected together at the suture and sides, leaving a fulvous crescent shaped spot on each elytron at the middle.

Type.—Cachabé, Ecuador; low c., XII, 1896, (Rosenberg). Length 6 mm.

Clypeus smooth, shining, front with T carina showing four broad flattened tubercles and an obsolete ridge above, on either side parallel with the eye, rest of surface thickly punctate; antennae filiform, fulvous, (eleventh joint missing) thorax quadrate, sides margined, very slightly sinuate, all angles prominent, surface almost equate, punctate, sparsely pubescent, faintly depressed behind, both transversely and longitudinally; elytra with shoulders not prominent, declivous and narrowed behind, a faint anti-median depression a little more marked where it curls up to the shoulder, the black subbasal band is drawn back from the scutel, having a triangular shaped yellow area which includes the scutellum and the black is pushed forward and almost attains the base, where it meets the black edge of the thorax. The whole surface is finely pubescent which gives it a dull look, body beneath and legs yellow, claws appendiculate.

The markings of the elytra recall *Physimerus ephippium* Clk. and its allies.

One example.

Homotyphus (Omototus) rosenbergii nov. sp.

Stout, rufous, pubescent, thorax strongly narrowed from base to apex, sides nearly straight, angles all prominent, hind obtuse, elytra deeply punctate striate, smooth at apex, a wide dense subbasal band of ashy sericeous pubescence extends nearly to the apex, beginning at about the apical quarter; the elytral apex is as clean as if trimmed with a knife, each elytron in a curve having the apex smooth, and shining, also the base, body beneath, and legs are polished rufous.

Type.—Cachabé, Ecuador; low c., I, 1897, (Rosenberg). Length 6 mm.

Head with broad smooth transverse, clypeal groove and frontal tubercles, and a smooth longitudinal carina on the vertex, remainder punctate pubescent; antennae fairly well separated, short, stout, gradually incrassate to middle, reaching just below the shoulder, the second joint globose, first and third about equal and the longest of all; thorax with almost equate surface, dull, punctate, pubescent, the base broadly sinuate; scutellum broad triangular; elytra broad and stout, base emarginate, sinuate (fitting the thorax) a faint transverse basal depression giving prominence to the scutellar region; the pubescence from the depression to the smooth apical area is very dense and thick, under the smooth surface the large punctures are regularly continued, as well marked cells in longitudinal rows; front legs rather long and slender, the middle femora with a small tooth near the base, the last joint of the tarsi (especially noticeable in the anterior leg) deeply bilobed, hind femora very stout, obtusely toothed near the apex, the tibia strongly curved at the base dilated at the middle and straight, ending in a single strong tooth, claws appendiculate.

It is with doubt I include this form in *Omototus* but the genus is very nondescript at best, and at present it seems better to enumerate the forms rather than increase the genera.

Homotyphus (Omototus) iridipennis nov. sp.

Entirely castaneous brown, anterior tibia and tarsi and antennae nearly black, elytra punctate striate, thinly clothed with flavous pubescence and with an obvious faint metallic gloss.

Type.—Cochabamba, Bolivia. (Germ.) Length 5 mm.

Clypeus with a strong inverted V carina, ending just above the antennae, in a deep, short longitudinal fovea, which in turn ends in a transverse groove, vertex thickly and rather coarsely punctate; antennae filiform, reaching the middle of the elytra, third joint the longest of all except the first; thorax transverse, sides margined, faintly sinuate at middle, angles all prominent, faintly depressed antemedianly and obsoletely so on each side behind, surface thickly punctate, dull; elytra with scutellar and humeral calli obsoletely

developed, not transversely depressed, punctures distinct to apex, pubescence very short, fine and silky and somewhat thicker at apex; four anterior tibiae and tarsi very dark rufous, claws bifid.

This form together with *quadri-plagiatus* Jac., *rubripennis* Jac. and *rufolimbatus* Jac. seem to be closely allied.

One example.

Homotyphus bolivianus nov. sp.

Entirely reddish fulvous, darker in the very deep clytral depression, the surface sparsely clothed with sericeous pubescence, which is most noticeable on the disk and apex of the elytra, antennae incrassate, thorax with a deep longitudinal fovea beginning at or just back of the anterior edge and ending just back of the middle.

Type.—Cochabamba, Bolivia. (Germ.) Length 2.25 mm.

Clypeus with a transverse carina, having a short branch in the middle extending between the antennae, front with two well developed round tubercles between the eyes, with a fovea between, rear part of head closely punctate; antennae reaching a little below base of elytra, stout, incrassate, middle joints darkened; thorax elongate, sides sub-angulate at middle (like *Tetragonotus*) and rounded and depressed in front (like *Rhinotmetus*), upper surface with a deep oblique fovea on each side behind, running from the middle of the base towards the anterior angles, the effect being to make in connection with the median fovea, two high ridges which join behind the middle at a point; elytra with punctures arranged in form of striae, obsolete behind, antemedian depression is very marked and forms a strong callous on each side of the scutellum, the claws are bifid.

An aberrant species and by the form of thorax a kind of connecting link.

One example.

Homotyphus crassus nov. sp.

Stout and parallel sided, general color rich brown, almost black, with the head, thorax and base of elytra and scutellum livened with shining yellow pubescence, antennae rufous, the joints five, six, nine and eleven paler, tarsi, especially the posterior, rufous, elytra spinous at base, behind the middle and near apex.

Type.—Cochabamba, Bolivia. (Germ.) Length 7 mm.

Front of head with a well marked ridge between the eyes, bisected by a median groove running to the base and having on either side a well marked fovea at the upper margin of the eye, surface finely closely punctate; antennae approximate, reaching the middle of the elytra, joint three is slightly longer than two; thorax transverse, nearly quadrate, sides compressed at rear, making

a slight angulation before the middle, anterior angles prominent, excurved, tuberculiform (analogous to *lacunosus* Clk.) the upper surface rough with humps and points like a *Chlamys*. There is a well marked median groove, the sides of which form humps and ridges of which the most prominent are, a small one on each side near the anterior margin, then back of the middle a sharp carina on each side, nearly reaching the hind edge, and on each side, about the middle is a large hump. Elytra with a very deep antemedian curved depression which brings the scutellar region and shoulder knobs into great prominence, capped by short spines, curved backward, each elytron has scattered back of the middle about six knobs with similar spines, including two ante-apical near the suture, the whole surface is coarsely punctate striate, with deep foveate punctures, the striae being much broken and obsolete back of the basal depression; body beneath smooth shining black, legs black, the four anterior femora more or less rufous at base and all more or less sericeous with fine pubescence, claws appendiculate.

Near *lacunosus* Clk. and like *spinipennis* simulates a small longicorn.

Two examples.

Homotyphus spinipennis nov. sp.

Elongate, subparallel, general color dark grayish brown with the labrum, clypeus, antennae, coxae and a large spot on the apex of the posterior femora rufous, an indefinite transverse band across the apex of the elytra rather sparsely fulvous pubescent, a row of six or eight small spines arranged across the base of the elytra and eight or ten more postmedian.

Type.—Peru [square green label] (Callanga?). Second Jac. coll. (label n.i.m.) Length 6.5 mm.

Head not prolonged in front, clypeus transversely grooved truncate, antennae approximate, a broad shallow depression across the vertex, back of the eye, the surface closely punctate and with a faint line of yellow pubescence between the eyes bringing out two transverse tubercles just above the antennae, which latter are long and slender reaching nearly the apex of the hind femora, with the third and fourth joints nearly equal, the seventh, eighth and eleventh are dark rufous; thorax almost square, sides margined and slightly sinuate before the middle, the anterior angles strongly produced into an excurved tubercle (like *lacunosus* Clk. only more so), a broad median channel runs from the apex nearly to the base, making on either side a well defined ridge, at the middle forming a fair-sized tubercle, the entire surface finely punctulate and thickly covered with appressed yellow pubescence which shows when the specimen is turned in various lights; scutellum fulvous pubescent; elytra with gross punctures arranged in striate form, becoming obsolete towards the apex, a broad antemedian transverse depression curving up in the usual manner to the shoulders gives great prominence to the immediate

basal portion and on each elevated knob is placed a sharp, backward curved spine. The transverse depression forms a broad flattened area on the disk which is covered with fulvous pubescence and forms the bulk of the band above described. At the rear of the band where the elytral declivity begins is a group of four or five spines on each side. There is a secondary depression just before the apex which is marked behind by two more spines. The entire surface is dented with fine punctures and in the depressions is the short yellow pubescence. Body beneath shining black, legs black with the coxae and tarsi dark rufous, the rufous apex of the hind femora is clothed with fulvous pubescence. Claws appendiculate. Should apparently be placed near *braccatus* Clark.

Simulates in appearance some of the small longicorns.

One example.

Panchrestus (?) prasinus nov. sp.

Ovate, stout, above light olive green, labrum, body below and legs yellow, joints six, seven and eight of antennae and the anterior tibiae and tarsi more or less darkened.

Type.—Cachabé, Ecuador; low c., I, 1897, (Rosenberg). Length 4.5 mm.

Clypeus swollen, smooth shining, front longitudinally foveate and with fairly plain, smooth frontal tubercles forming the upper edge of the swollen clypeus, vertex and neck closely, strongly punctate; antennae filiform, reaching about one-third the length of the elytra, joints nine, ten and eleven lighter; thorax transverse, margined, strongly angulate a little before the middle, anterior angles also prominent surface thickly punctate, strongly obliquely depressed on either side, a faint antemedian callous; elytra rather convex, strongly punctate striate, covered with very fine pubescence and also with rows of sparse long hair, no trace of any basal depression, hind tibia with two spurs, claws cleft.

I place this form in *Panchrestus* on account of its palpi and shape of the thorax which seems near that of *rufescens* Clk. Unfortunately I have only one mutilated example of the genus in my collection and that is one from the second Jac. collection marked "n.i.m.," determined by me as *rubicundus* Clark.

One example.

Loxoprosopus jacobyi nov. sp.

Elongate, head, thorax and legs dirty yellow, labrum dark, antennae dark, joints eight to ten flavous, elytra dirty testaceous brown with sutural edge and a faint sub-marginal line of ashy pubescence, the ground color of the line being sometimes partly flavous.

Type.—♀; Amazon Valley near Santarem, Brazil. Length 4.5 mm.

Clypeus smooth, vertical, two side and a faint median carina, frontal tubercle quite prominent, adjoining and on the vertex is a well marked transverse fovea, the tubercle, fovea and a spot behind sometimes brown; thorax transverse, depressed behind on either side and also at the anterior angles, which are prominent, also an obsolete antemedian fovea, the surface sparsely golden pubescent; elytra deeply punctate striate, somewhat obsolete at apex, no visible basal depression, sparsely and inconspicuously pubescent, body beneath and legs flavous, claws appendiculate.

In addition to type two specimens from Demerara, British Guiana, Alte Sammlung, second Jac. coll., one marked "n.i.m.," both in rather poor order.

***Loxoprosopus bolivianus* nov. sp.**

Elongate, black, upper part of clypeus, thorax and anterior legs mostly yellow, elytra deeply punctate striate with a narrow marginal fuscous border from shoulder to apex, antennae a little longer than body, black, joints nine to eleven flavous.

Type.—Bolivia. Square dark green label. Second Jac. coll. Length 3.5 mm.

Clypeus with strong oblique side ridges meeting at the top, they and the space above yellow, below black, above the antennae a strong longitudinal fovea, remainder of the head thickly punctulate; antennal joints three, four and five the longest, joints one and six about equal; thorax transverse, margined, sides nearly straight, surface nearly equate, sparsely clothed with yellow pubescence; elytra with slightly indicated basal depression, the surface sparsely clothed with ashy pubescence, more noticeable on the light edge; body beneath black, anterior legs with tip of femora and tibia and tarsi browned, hind legs with flavous trochanters, femora black, slightly discolored near the trochanter, tibia and tarsi brownish red, claws appendiculate.

***Loxoprosopus* (?) *flaveola* nov. sp.**

Pale yellow, the antennae, anterior tibiae and tarsi, extreme apex of femora and an oblong spot on upper side of hind femora near apex, black; swollen claw of hind tarsi, rufous black, elytra with large punctures placed in striate form, nearly obsolete behind.

Type.—Cachabé, Ecuador; low c.: XI, 1896, (Rosenberg).

Clypeus with obsolete median and side carina, the latter being arched at the top, a well marked median fovea between the eyes with frontal tubercles flat and obsolete, vertex punctate; thorax transverse, depressed behind, and obsoletely so, medianly in front, sides margined, obsoletely subangulate in

the middle, the surface thickly punctate and with sparse light pubescence; elytra with basal depression barely indicated, surface with sparse light pubescence and longer hairs; claws appendiculate.

Two examples.

Loxoprosopus cyanipennis nov. sp.

Head and elytra brilliant greenish cyaneous, thorax more coppery, with the base fairly clothed with golden pubescence, body below black, legs flavous, anterior tibiae and tarsi cloudy, antennae dark fuscous, joints nine to eleven flavous.

Type.—♀; Cachaabé, Ecuador; low c.; XI, 1896, (Rosenberg). Length 4.5 mm.

Clypeus smooth, divided by a median and two side carinae, frontal tubercles well developed, vertex and neck smooth, shiny, nearly impunctate; antennae reaching nearly to apex of elytra, joints one and three much the longest; thorax transverse with straight sides, all the angles prominent, transversely depressed at base, the depression clothed with golden hair; scutellum black, elytra deeply punctate striate, becoming somewhat obsolete at tip, a fairly well marked transverse basal depression, the surface very sparsely clothed with dark hair; body beneath shining black, claws appendiculate.

Apparently allied to *L. caeruleus* Clk. (not in my collection), especially in the pubescence of the thorax. Type unique.

Loxoprosopus clarkii nov. sp.

Head black, clypeus and face yellow, thorax yellow, elytra dark bluish black, grossly punctate striate, a submarginal line of ashy pubescence from the shoulder to the apex, joining a much narrower sutural edging of the same pubescence, legs flavous, anterior tarsi and tip of the tibiae darkened, joints nine to eleven of antennae (except the extreme tip) flavous.

Type.—♀; Cachaabé, Ecuador; low c.; I, 1897, (Rosenberg). Length 4.5 mm.

Front smooth, vertical, with a plain median carina and a deep transverse frontal clypeal groove, a fairly well marked transverse depression between the eyes, back of the head smooth; antennae longer than the body with first joint strongly swollen at about the upper two-thirds; joints three, four and five elongate, the third the longest; thorax transverse, depressed, slightly constricted behind, surface dull with fine yellow pubescence, scutellum black; basal depression of the elytra indicated only by a slight raising of the scutellar region, punctures of about the same style as *humeralis* Clk., body beneath black, claws appendiculate.

Type unique.

Zeteticus cyanipennis nov. sp.

Elongate, slim; head, thorax, scutellum, underside and legs rufous, the anterior tibiae and tarsi brown, antennae brown, elytra shining greenish cyanaceous with light punctures arranged as striae, the intervals finely punctulate, the surface sparsely finely yellowish pubescent.

Type.—Venezuela. Square yellow label (Caracas?). Second Jac. coll. "n.i.Mus." Length 4 mm.

Head with well marked frontal tubercles and a transverse fovea between the eyes, vertex and neck coarsely punctate; antennae filiform, scarcely reaching the middle of the elytra; thorax more thickly punctate than the head, with scattered very fine yellow pubescence, very obsolete oblique depressions behind, the sides finely angled like in *ecuadoriensis* Jac.; elytra with a distinct basal depression, most marked where it turns to go up to the shoulder, the anterior half of the suture has a tendency to show rufescent; claws bifid.

Metallicus Jac. is much larger. Type unique.

Zeteticus viridipennis nov. sp.

Elongate, head, thorax and scutellum rufous, elytra dull metallic green, strongly punctate striate (except tip), the intervals thickly punctulate, the entire surface covered with appressed yellow pubescence and rows of sparse long hairs, body beneath and legs dark blackish green.

Type.—Cochabamba, Bolivia. (Germ.) Length 7 mm.

Clypeus with a strong transverse impression, head thickly and closely punctate with a transverse fovea between the eyes and obsolete frontal tubercles; antennae filiform, black, reaching the middle of the elytra; thorax transverse, punctured like the head with obsolete median and basal foveae, angulated at the sides after the manner of *ecuadoriensis* Jac.; elytra with a very obsolete basal depression so that the scutellar region is slightly raised; legs and under part of the body more or less yellow pubescent; claws bifid.

Two examples.

Octogonotus piagiatus nov. sp.

Elongate, head black, thorax yellow, elytra yellow, golden pubescent, an elongate spot at the shoulder, a common nearly square spot at the base, a straight transverse submedian band not reaching the sides, the apex, the sharp edge of the lateral margin and the epipleurae black, pubescent, body beneath yellow, tibiae and tarsi of the four anterior legs black, posterior yellow, all the femora somewhat black.

Type.—Cochabamba, Bolivia. (Germ.) Length 7 mm.

Clypeus with a deep transverse groove, occupying the whole space, front and vertex with a well marked broad longitudinal groove running between the antennae, frontal tubercles small and obsolete, surface thickly punctured; antennae filiform, rufous, reaching below the middle of the elytra; joints six, seven and eight darker, nine, and ten, flavous, eleven dark at tip; thorax with usual side angulation of the genus, obsoletely depressed on either side behind and longitudinally depressed down the middle with a fairly prominent callous on each side, surface dull with fine pubescence; elytra, with sparse, erect hairs, surface strongly punctate striate, but back of the black transverse band almost entirely obscured by the thick golden pubescence, a faint longitudinal depression at the shoulders; posterior femora with brownish black apex, anterior with dark streak on upper side, the swollen claw joint very dark rufous and conspicuous at the end of the yellow tibia and tarsi, claws appendiculate.

Allied to *limbata* Baly. Type unique.

Octogonotus lateralis nov. sp.

Robust, elongate, black, head more or less yellowish, thorax brownish red, in the middle, with a wide side stripe of golden yellow hair, leaving the sharp lateral edge dark, elytra dark brownish black, a sub-marginal yellow stripe covered with ashy golden hair from the shoulder nearly to apex, wide at the shoulder and narrowed at apex, the suture in the middle narrowly edged with ashy golden hair, body beneath shining black, anterior legs black, femora yellow beneath, posterior legs yellow with femora black above and at apex.

Type.—Cochabamba, Bolivia. (Germ.) Length 7 mm.

Clypeus with a broad transverse depression, a longitudinal fovea on the front and between the antennae, which are black, filiform; frontal tubercles obsolete, the surface thickly punctate; the general color is brownish yellow with the tubercles and between them and the eyes black, neck darkened; thorax transverse, very strongly angulate, abruptly and strongly transversely depressed behind, with a short smooth medium carina cut off by the depression; elytra finely punctate striate, everywhere covered with a very short ashy pubescence and scattered long hairs in lines; the light stripe is co-extensive at the base with the light side of the thorax and cuts across the striae; body beneath black, swollen claw joint of the hind legs conspicuously dark rufous, claws appendiculate.

Allied to *limbata* Baly. Type unique.

Octogonotus similis nov. sp.

Bright rufous, tips of mandibles, eyes, joints two to eleven of antennae, four anterior tibiae and tarsi black, elytra rather

strongly depressed, the entire surface sparsely clothed with short yellow pubescence.

Type.—Pará, Brazil. (Baker.) Length 5 mm.

Clypeus broadly transversely depressed, with fairly well defined sides, and frontal ridge which forms a point between the antennae, front with longitudinal fovea, tubercles obsolete, surface closely punctate; antennae filiform, but rather stout reaching about the middle of the elytra, entirely black except the scape and extreme base of the second joint; thorax strongly angulate, surface nearly equate, thickly and strongly punctate, a short smooth median carina, the usual median callouses showing obsoletely, somewhat shiny; elytra strongly punctate striate, becoming obsolete at apex, strongly depressed at base so that the scutellar region is prominent; claws appendiculate.

Near *apicicornis* Jac., but that species has differently colored antennae and legs, and is stouter and more hirsute, and the elytra are much more strongly punctured. Type unique.

Haplotrius plagiatus nov. sp.

Head black, thorax yellow, thickly covered with golden pubescence, elytra cyaneous blue, with punctures arranged in striate form, the sides and apex clothed in dense golden pubescence, leaving a common, oblong seemingly bare spot, stretching from the base to a little below the middle, legs yellow, the four anterior tibiae and tarsi and apex of posterior femora black.

Type.—Cachabé, Ecuador; low c.; XII, 1896. (Rosenberg). Length 5.5 mm.

Clypeus with a deep transverse groove, somewhat triangular in form, occupying the whole front, making an inverted frontal V fovea, vertex black, rather coarsely punctate and sometimes showing a partial smooth median carina (sexual?); antennae filiform, testaceous, clouded in the middle, thorax transverse, sides almost straight like *pubescens* Ck., faintly obliquely foveate each side behind, all the angles sharp but not prominent. The entire surface yellow, pubescent, except a narrow dark edge adjoining the elytra, scutellum black; elytra with strong basal depression not, however, curved up to the shoulder as strongly as in many but more like a deep sub-basal fovea; the seemingly bare spot is sparsely covered with dark hairs which can best be seen from the front (looking to a white background). The intervals occasionally seem to be very finely punctulate, body beneath black, claws appendiculate.

Six examples seen from the type locality, also three from Paramba (near Cachabé), also one example from Santos Marcos, Bolivia, 2000 m., second Jac. coll., "n.i.Mus." (rubbed in poor condition).

Haplotrius parvulus nov. sp.

Head rufous, vertex black, antennae rufous flavous, joints one to two and seven, eight and nine darker, thorax rufous, elytra black, deeply punctate striate, sparsely pubescent, mostly noticeable at apex, anterior legs blackish rufous, posterior legs rufous with black femora.

Type.—Bolivia. Square green label (Songo?). Second Jac. coll. Length 3.5 mm.

Clypeus with deep transverse groove, inverted V shaped or excavation, front finely longitudinally grooved, limited behind by a transverse smooth line between the eyes, vertex and neck thickly finely punctate; thorax transverse, transversely depressed behind and anteriorly on each side, antemedian callouses fairly prominent and a fine smooth carina from middle nearly to base, sides nearly straight; scutellum black, elytra with a fairly well marked basal depression, the striae and punctures less well defined at apex; claws, appendiculate.

Somewhat resembles *fulvicollis* Jac., but much smaller. In addition to the type we have one example from Farinas, Bolivia

Haplotrius rosenbergii nov. sp.

Elongate, head black, antennae black, joints nine to eleven testaceous, thorax and scutellum fulvous, elytra deeply punctate striate, dark indigo blue, sides and apex visibly ashy pubescent, legs flavous, anterior tibiae and tarsi and apex of posterior femora black.

Type.—Chimbo, Ecuador; 1000 feet; VIII, 1897, (Rosenberg). Length 5 mm.

Head with deep clypeal excavation in form of inverted V, frontal tubercles smooth, vertex and neck thickly punctate, dull; antennae filiform, approximate, reaching the middle of the elytra; thorax somewhat transverse, sides nearly straight, a vague transverse fovea on each side about the middle, angles all sharp but not prominent (shape of *flavofasciata* Jac.); elytra coarsely punctate striate, faintly foveate sub-basally, the pubescence on the sides and apex is visible without a glass, but scarcely obscures the punctures except at extreme apex; body beneath black, claws appendiculate.

Two examples seen.

Cerichrestis apicatus nov. sp.

Head black with clypeus and neck flavous, antennae black, joints nine to eleven flavous, thorax yellow, thickly covered with golden pubescence, elytra golden yellow, with the suture and apical part (nearly half) black, both with pubescence according

to their colors, legs black, four anterior femora yellow at base; hind legs yellow, femora with a black stripe on each side meeting at apex, having the extreme upper edge yellow.

Type.—Cachabé, Ecuador; low e.; I, 1897, (Rosenberg). Length 6 mm.

Head with usual frontal tubercles very obsolete, the surface back of the eyes closely punctulate, the yellow color covers the neck and curves round and touches the eyes; antennae approximate, joints one to two stout, three to four elongate, flattened, equal, five to six equal, narrower and shorter, seven to ten gradually shortened, filiform; thorax slightly constricted in front, sides margined, sinuate, all the angles prominent, the usual depressions very obsolete, so the surface is nearly equate, scutellum rufous; elytra deeply punctate, striate, finer at apex, body beneath with sides black, middle flavous, the femora of the front leg is strongly curved and the tibiae are curved in and then out, the middle legs are the same only the tibia less markedly curved, hind femora beneath strongly excavate curved, with a well developed tubercle at base (coxal?); claws appendiculate.

Resembles in general appearance some of the forms of *C. clarki* Jac. The type is unique.

***Cerichrestis jacobyi* nov. sp.**

Head black with clypeus and frontal tubercles yellow, thorax black with a wide yellow margin covered with golden pubescence, elytra black with suture narrowly and margin widely, yellow bordered and both covered with golden pubescence, legs yellow, anterior tibiae and tarsi black. Apex of posterior femora with a black spot.

Type.—Peru. Square light green label. (Callanga?) Second Jac. coll. "n.i.m." Length 5 mm.

The color of the frontal tubercles makes them prominent, back of them the head is thickly punctate, the antennae reaching the middle of the elytra, the joints subdilated; thorax quadrate, sides straight, margined, all the angles prominent, the extreme sharp edge of the sides is dark, narrowly bordering the golden side, scutellum black; elytra strongly punctate striate, the yellow border is co-extensive with the thoracic yellow edge, cuts across the striae and is continued to the apex where it joins the sutural line which is very narrow, body beneath rufous, claws appendiculate.

Type unique.

***Cerichrestis curvilinea* nov. sp.**

Head black, with clypeus and front yellow, antennae black, joints ten to eleven yellow, thorax black, sides broadly yellow,

elytra black with a broad yellow margin from base to apex and on each a narrow curved line of yellow pubescence, starting below the base on the third interspace, following that and gradually broadening out to the fourth, body beneath and legs yellow.

Type.—Peru. Square light green label. (Callanga?) Second Jac. coll. "n.i.m." Length 4 mm.

Head with the yellow color just covering the frontal tubercles, back finely punctate; thorax slightly transverse, sides margined, slightly sinuate, obsolete transversely depressed behind so as to appear somewhat swollen at the middle; the yellow parts of the thorax and elytra are covered with golden pubescence, the curved elytral line is only obsolete yellow and seems to depend for its color almost wholly on the pubescence, but the three examples vary somewhat among themselves in this regard.

Three examples seen.

Metriotes aeneipennis nov. sp.

Elongate parallel, head very dark rufous, thorax transverse, rufous, elytra aeneous, striate punctate, with very sparse and short yellow pubescence arranged in rows, scarcely noticeable, except near the apex, where it is seen on the declivity, body beneath black, legs rufous, hind tibiae finely serrate or dentate on outside edge.

Type.—Cochabamba, Bolivia. (Germ.)

Clypeus smooth, carinate on either side, joining in a pair of longitudinal tubercles or knobs which separate the antennae and end in a deep rather transverse fovea which occupies the vertex, neck coarsely and closely punctate, finely pubescent near the eyes; antennae filiform reaching the middle of the elytra; thorax transverse, margined, sides straight, all the angles sharp, the anterior slightly excurved, surface, coarsely and closely punctate, more thickly at sides, an obsolete smooth callous on each side of the ante median disk; obsolete depressed on either side and behind, scutellum rufous; elytra punctate striate, becoming obsolete at tip, interstices finely punctulate, broadly but not deeply depressed before the middle, the depression curving upward near the shoulder as usual and bringing out the scutellar region and humeral knobs. Claws appendiculate.

Eight examples seen with type data, also one in second Jac. coll., probably from the same place, marked "n.i.m."

Var. *A*, three examples from same locality with a decided tint of castaneous red to elytra (immature?).

Var. *B*, three examples from same locality with elytra bluish aeneous.

Metriotes lateralis nov. sp.

Elongate, black, the elytra with an even, yellow sublateral stripe running entirely around the elytra, except the base; the thorax, the stripe and the sutural edge covered with thick fine golden pubescence, hind tibiae and tarsi rufous, antennae slightly incrassate after the fifth joint, reaching the middle of the elytra, black with joints ten to eleven rufotestaceous.

Type.—Cochabamba, Bolivia. (Germ.) Length 6.5 mm.

Clypeus with a strong carina or ridge on either side, joining in a point at the base of the antennae and running into a short deep longitudinal fovea, the sides of which make two short prominent oblique ridges or frontal tubercles (parallel with the eye), vertex and neck smooth, finely punctulate, the eyes are nearly surrounded with golden pubescence which also forms a transverse band between the eyes; thorax transverse, sides margined, very lightly sinuate before the middle, all angles prominent, surface with an oblique depression either side of the middle, behind, which gives prominence to the median part, the surface clothed rather thickly with golden pubescence which also covers the scutellum; elytra strongly punctate striate, thickly covered with short black pubescence (except the sutural edge and sublateral margin which are clothed with golden hair), the sublateral stripe is perfectly straight on its edges, does not follow the punctured striae and nowhere touches the margin, though extremely close to it at the apex, the width of the yellow submarginal stripe is about $\frac{1}{2}$ mm, slightly thickened at the apex; body beneath and legs shining black, with the posterior tibiae and tarsi rufous, claws appendiculate.

Type unique.

Metriotes chacoensis nov. sp.

Elongate black, clypeus, parts of femora and tibiae, and a sublateral elytral stripe yellow, and basal joints of antennae annulate at tip with same color, the head, thorax and the stripe as well as the sutural margins, clothed more or less thickly with golden pubescence.

Type.—Chaco, Bolivia. Square green label. Length 5.25 mm.

Head yellow below, labrum piceous, clypeus yellow, two side carinae meeting in a point between the antennae and ending there in a short fovea, rest of surface finely punctulate, between the eyes a distinct band of golden pubescence, which in certain lights is seen to extend over the whole back of the head; antennae filiform, the last five or six joints somewhat transverse, the last three joints covered with ashy pubescence, so appearing paler; thorax transverse, sides margined, straight, all the angles prominent, the hind ones very narrowly flavous, transverse depression well marked at base and continued obliquely upward, throwing up the middle prominently, scutellum clothed with golden

hair, the yellow markings and pubescence are like *lateralis*; body beneath shining black, the anterior legs are yellow with the upper side of the apical half of the femora and apex of tibiae and tarsi black, hind legs yellow with the apex of femora particularly on top and the tarsi black, claws appendiculate.

Near *lateralis* but much smaller with different colored legs.

Three examples bear the type data, also one probably from same place in Second Jac. coll. marked "n.i.m."

Metriotes sericeus nov. sp.

Elongate black, elytra punctate striate black, with a narrow sub-border stripe of yellow color, the entire surface thickly covered with very short appressed grayish yellow pubescence, so thick as nearly to obscure all the markings.

Type.—Peru. Square green label. (Callanga?) Second Jac. coll. "n.i.m." Length 5.5 mm.

Clypeus with usual side carinae which are blunt and form at their junction a smooth knob or tubercle between the antennae and ending in a deep longitudinal frontal fovea with high side walls making two frontal tubercles, vertex and neck punctulate; antennae filiform, black, reaching the middle of the elytra; thorax transverse, sides margined, straight, all the angles prominent, two oblique side basal depressions giving prominence to the middle which is rather shiny, the rest of the surface opaque with black pubescence; the scutellum and elytra present an unbroken surface of sericeous pubescence, under which the markings are but faintly made out; body beneath and legs shining black, outside edge of hind tibiae serrate, claws appendiculate.

With the type I associate an example from Cochabamba, Bolivia, (Germ.).

Metriotes marginatus nov. sp.

Elongate, black, clypeus, thorax and small antehumeral spot rufous, elytra strongly punctate striate, with very short ashy pubescence, which is thickened so as to show a narrow distinct sutural edge and a wide sublateral stripe to the apex.

Type.—Cochabamba, Bolivia. (Germ.) Length 4.5 mm.

Clypeus smooth with the usual carinae rather obsolete, the usual frontal fovea makes two rather prominent knobs, limited behind by an obsolete transverse depression, vertex and neck punctulate; antennae filiform, black, reaching below the middle of the elytra; thorax transverse, sides margined, straight, all the angles prominent, an obsolete transverse basal and side oblique depression brings the disk into prominence, the surface finely pubescent; elytra with a very obsolete basal depression, the small rufous spot adjoins the thorax and just touches the humeral knob; body beneath and legs black, somewhat pu-

bescient, outside edge of hind tibiae serrate (rather obsolete), claws appendiculate.

Two specimens seen.

Ptinomorpha ? **foveolatus** nov. sp.

Almost uniform light brown, antennae incrassate, shoulders of elytra rounded, the surface of the elytra shining, covered with deep, elongate foveate punctures, striate only at the shoulders, and laterally; the fovea closer, more drawn out, confluent at sides, flatter and broader on disk, the surface sparsely hirsute, hind tibiae serrate and dentate on outside edge.

Type.—Cachabé, Ecuador; low c.; I, 1897, (Rosenberg). Length 4.25 mm.

Head vertical, a strong transverse ridge between the eyes, bisected in the middle by a short longitudinal fovea, vertex with coarse foveate punctures, neck smooth and glabrous; antennae approximate, reaching just below the base of the elytra, third joint slightly longer than second, fourth and following about equal to the second, slowly incrassate from the second joint, reaching the maximum width at about the seventh joint, then slowly tapering off; thorax slightly transverse, nearly square, sides almost straight, margined and with a plain straight marginal line near to and parallel to the rear edge, surface coarsely reticulated with humps and foveae, the most noticeable of the former being two anterior side and one median, placed triangularly Δ ; scutellum smooth; elytra with well marked antemedian scutellar depression (not curving upward to the shoulders), making a prominent scutellar callous, epipleurae wide, smooth, longitudinally punctured; hind tibiae with three quite prominent well separated denticulations, claws appendiculate.

Resembles *claphrus* and easily separated by its foveate punctation. The type is unique.

The structure of the antennae and the dentation of the hind tibiae seem to warrant the placing of this form in Von Harold's genus.

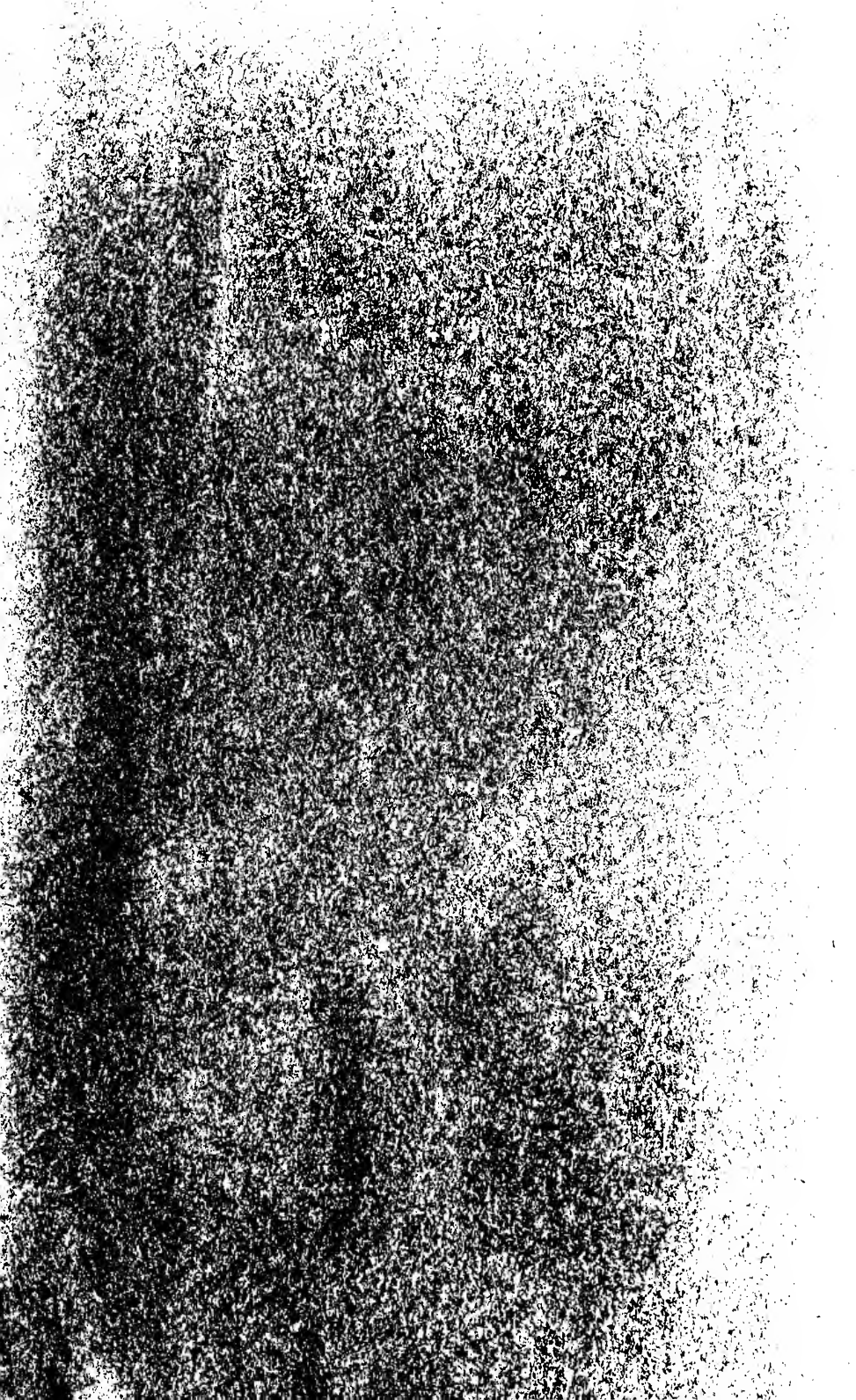
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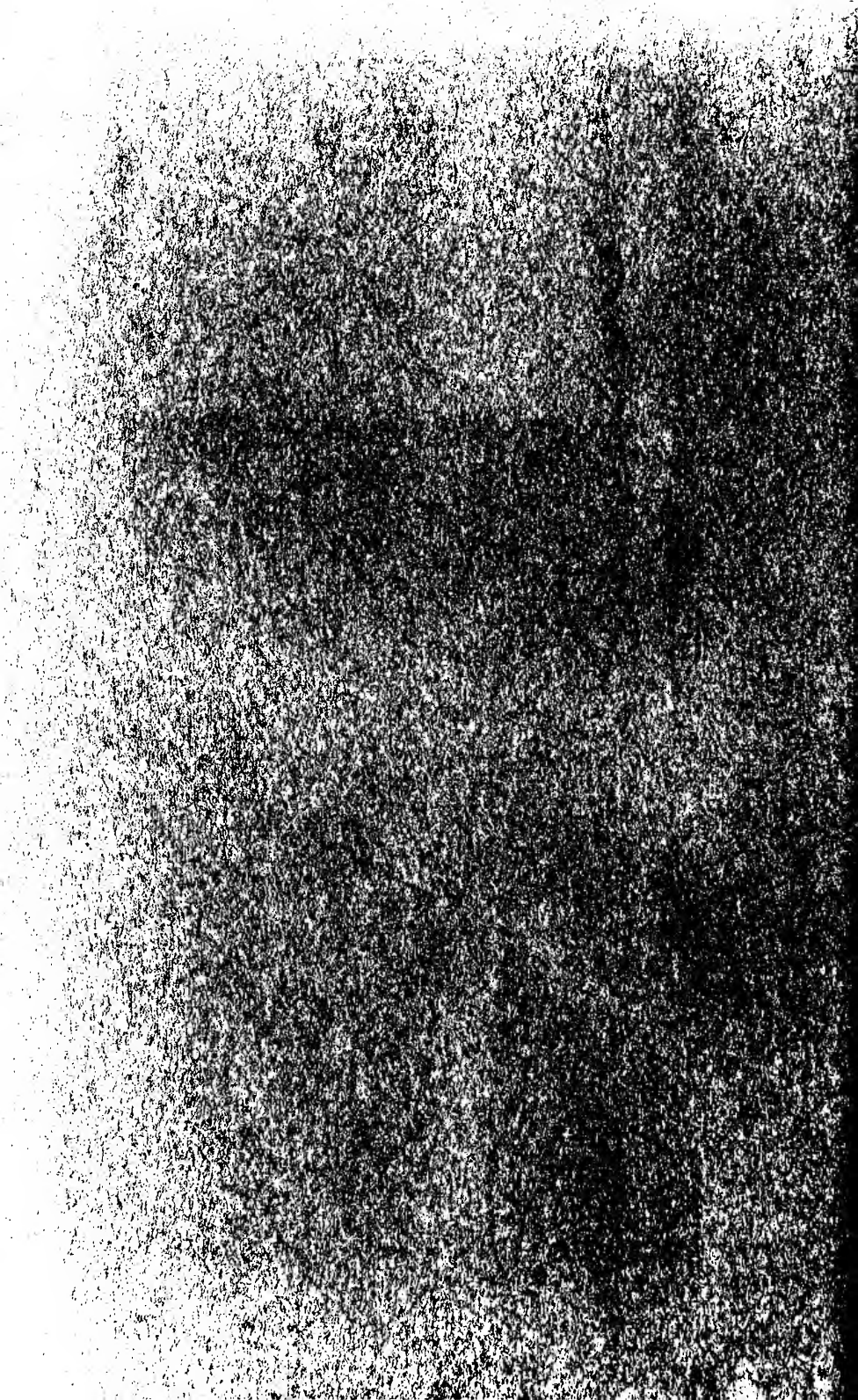
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