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**THE GENUS KEONOLLA
(HOMOPTERA, CICADELLIDAE)**

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The genus *Keonolla* was erected by Oman in 1949² and *Proconia confluens* Uhler was designated as the genotype.

The major characteristics of the genus are: Resembling *Neokolla* Melichar and previously placed in that genus. The male genital structures show relationship to *Graphocephala* Van Duzee. Head wider than pronotum, anterior margin rounded to front. Crown broad and tending to be flat, median length greater than length next the eye. Forewing with a small appendix, inner anteapical cell short, central anteapical cell parallel-sided, first apical cell long and membranous. Male plates elongate, triangular, connective Y-shaped, junction with aedeagus terminal. Aedeagus asymmetrical, with a pair of elongate acuminate processes extending dorsad from base. Aedeagus shaft short, small, lying dorsad of base of aedeagus.

Four species and one subspecies have been placed in the nearctic fauna. Three of these are southern or southwestern and one is northwestern in distribution. Six other species and one subspecies which have been collected in Mexico and the southwestern United States and which show relationship to the known species are being described at this time.

All types are in the DeLong collection unless otherwise designated.

Keonolla confluens (Uhler)

Proconia confluens Uhler, Proc. Acad. Nat. Sci. Phila., P. 285, 1861.

A blunt headed species with a rather broad crown, variable in intensity of color markings and variable in the male genital structures. Length 6.5-7 mm.

Crown broad, blunt, about one-third wider between eyes at base than median length.

Color varying from pale gray or brownish to black, and markings varying in intensity. In normally well marked specimens the crown is pale with a spot at apex posterior to which is a pair of proximal longitudinal marks and from which a series of reflexed arcs extends laterally on each side of median line. On the basal half a pair of proximal, elongate, circular rings extends through the

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² Wash. Ent. Soc. Mem. No. 3, p. 74.

ocelli. An elongate, longitudinal mark is next the eye on each side. Pronotum mottled with pale brown. Scutellum black with three prominent pale markings, an apical median dash and a pair of separated, elongate basal spots. Forewings tinted with pale brown, veins dark. Some specimens at hand are almost entirely dark brown or black with few pale areas. Certain others have dark forewings with a broad pale stripe along the claval vein as in *dolobrata*.

Genitalia: Female seventh sternite roundedly produced forming a blunt apex. Male genital structures variable. In typical specimens the plates are elongate and tapered to blunt apices. The styles are rather long with blunt apices. In lateral view the apical portion of the aedeagus bears two erect processes which are about equal in length, bent forward on the apical half and broadened just before a constricted and pointed apex.

This is a common species in the northwestern United States on shrubs and herbaceous plants. It commonly occurs upon certain species of willow.

Due to variability in color and genital structures this species appears to have a great variety of mutants and is difficult to identify. A considerable amount of biological work will probably be required to establish species limitations in this variable complex.

Keonolla confluens surcula, n. subsp.

Resembling *confluens* in form and appearance but with different genital structures. Length 6-7 mm.

Crown appearing more angularly produced than in *confluens*, about one-fourth wider between eyes at base than median length.

Color: Crown usually well marked. The pale spot at apex surrounded by a black band which extends above the margin on each side almost to eye. This band is curved basally and surrounds the reflexed arcs. Between the ocelli on the disk is a pair of proximal elongate "horseshoe" shaped bands with the open end basally. A pair of elongate black spots extends the length of the eyes between the eyes and ocelli. The anterior portion of the pronotum is mottled with dark brown and black. Scutellum black with an elongate pale spot on the apical half and a pair of elongate pale lateral spots. Wings brown with white mottling.

Genitalia: Female seventh sternite with posterior margin produced, the central half appearing as a produced lobe. Male plates long, triangular, with pointed apices. Style narrowed to inner margin at two-thirds its length to form a pointed apex which is curved outwardly. Aedeagus with an erect basal process and two

long erect processes on the apical half. The anterior process is decidedly shorter than the apical process.

Holotype male, paratype male and allotype female collected at Twin Falls, Idaho, July 22, 1938, from willow by Dr. Richard Hofmaster.

Keonolla conflucns subsp. *pacifica* (DeLong & Severin)

Neokolla conflucns var. *pacifica* (DeLong & Severin), Hilgardia 19: 177-8, 1949.

Resembling *conflucns* in size and general appearance but the male genitalia are different. Length 6.5-7 mm.

The crown is bluntly produced as in *conflucns*.

Color: The crown and scutellum are vividly marked with black by an interrupted, rather broad transverse band just above the margin of apex, and an open "horseshoe" marking either side of middle at the base. This is a modification of the *conflucns* color pattern.

Genitalia: The posterior margin of the female seventh sternite is produced to form a broad, median produced apex. The male plates are elongate, triangular, with narrow produced apices. The styles are gradually narrowed to a narrow apex which is truncate with a projecting tooth on the outer apical margin. The aedeagus has a short dorsal process at the base and has two long dorsally directed processes, one at the apex of the ventral portion and the other, which is a little shorter, arises at about the middle of the ventral portion. These are quite slender in comparison to the similar aedeagal processes of *conflucns* and are convexly curved on the caudal margin just before the narrow, acutely pointed tips.

A series of California specimens which are very similar in markings and genital structures has indicated that this may be a subspecies or even a specific form closely related to *conflucns*.

It has been collected in good numbers on *Adenostoma* in Los Angeles County, California.

Keonolla lugubris (Signoret)

Tettigonia lugubris Signoret, Ann. Soc. Ent. France (3) 2:13, 1854.

Resembling *conflucns* in form and appearance and closely related to it. Length 6-6.5 mm.

Crown broad and bluntly angled, less than twice as wide between eyes at base as median length.

Color varying from pale with brownish markings to almost black.

In many specimens the coloration is similar to the color pattern of *confluens*. The reflexed arcs just above the margin of the crown and the dark circular rings either side of middle on the basal half resemble the same markings in *confluens*. An additional marking is a curved line extending from the ocellus, each side, basally then toward the eye and forward to the anterior margin of the eye. The pronotum is pale, mottled with brown. The scutellum is dark with the median area pale. The forewing is usually marked with darker veins except the claval suture which is light.

Genitalia: The posterior margin of the female seventh sternite is rather broadly, roundedly produced. The male plates are long and tapered to rather blunt, rounded apices. The styles appear broad and rather abruptly narrowed near the apex to a pointed tip. The ventral portion of the aedeagus is broad in lateral view with two dorsal erect processes arising near the apex. The posterior process is a little longer than the preceding process; both are rather broad with a constriction near the apex, producing narrow pointed tips.

This is a common species in Mexico. Specimens are at hand from Mexico City D. F., Chapingo D. F. and Chiapis. It also is reported for the states of the southwest which border Mexico.

Kconolla uhleri (Ball)

Tettigonia hieroglyphica var. *uhleri* Ball, Proc. Iowa Acad. Sci. 8: 18, 1901.

Cicadella hieroglyphica var. *inscripta* Olsen, Ann. Ent. Soc. Amer. 15: 360, 1922.

Cicadella hieroglyphica subsp. *lutzi* Olsen, Ann. Ent. Soc. Amer. 15: 360, 1922.

Cicadella hieroglyphica subsp. *barberi* Olsen, Ann. Ent. Soc. Amer. 15: 361, 1922.

Resembling *confluens* in form, general appearance and coloration. The male genital structures will separate this from related species. Length 6–6.5 mm.

Crown rather broad and bluntly angled, almost two-thirds as long as basal width between the eyes.

Color variable, grayish green or reddish brown with a color pattern similar to *confluens*. The reflexed arcs on the anterior margin of the crown are conspicuous either side of median apical pale area. The basal portion of the crown is pale with a pair of approximate median lines, and a heavier pair extending through the ocelli, converging anteriorly. The pale area between the ocelli and the eye,

either side, contains dark markings. The pronotum is pale with darker mottling. The scutellum is dark with several pale spots. The forewings are mottled, veins usually darker.

Genitalia: The posterior margin of the female seventh sternite is produced on the posterior margin and rounded at apex. The male plates are elongate, tapered and with bluntly angled apices. The styles are narrowed on the apical third to pointed apices. The aedeagus has two long erect processes extending dorsally from the ventral portion. The posterior of these processes is rather uniform in width on the apical half before being narrowed to form a pointed tip. The anterior process is conspicuously broadened just before the rapidly narrowed apical portion.

This is a common species in the southwestern United States and in smaller numbers in the states just west of the Mississippi River.

Keonolla dolobrata (Ball)

Tettigonia hieroglyphica var. *dolobrata* Ball, Proc. Iowa Acad. Sci. 8: 18, 1901.

Typically black in color with a few pale markings and with genital structures similar to *confluens*. Length 6–6.5 mm.

Crown bluntly angled, about two-thirds as long at middle as basal width between the eyes.

Color: Usually shining black with a pale band just back of black spot on apex of crown, a median pale longitudinal band on base of crown, a broad median longitudinal band on base of scutellum and a pale band on claval suture of the forewing. In paler specimens the crown and pronotum are pale with dark markings and the forewings appear striate.

Genitalia: The posterior margin of the female seventh sternite is roundedly produced. The male plates are elongate, triangular and tapered to blunt apices. The styles are narrowed on the apical fourth to blunt apices. The aedeagus bears two erect processes which arise from the median ventral and apical ventral portion. Both are rather broad and are abruptly, concavely narrowed to a pointed tooth at apex. The posterior process is slightly longer.

This species apparently extends from the Mississippi River through the southwestern U. S. and into the foothills of the Rocky Mountains. It was previously misidentified for many years under the name *hieroglyphica*.

***Keonolla minuenda*, n. sp.**

Resembling *dolobrata* in general form and appearance but

smaller, with different color markings and with narrow aedeagal processes. Length 4.5–5.5 mm.

Crown rather blunt at apex, well produced, about three-fifths as long at middle as basal width between the eyes.

Color: Crown, pronotum and scutellum yellowish to greenish with dark markings. There is a large black spot at apex and a pair of longitudinal parallel bars behind the spot, on anterior portion. These bars are on the inner margins of the blackened areas containing the reflexed arcs from front. The median longitudinal portion of crown rather broadly pale. On the posterior portion a broad black mark expanded both anteriorly and posteriorly extends longitudinally just medially from each ocellus. A small black line extends from each ocellus toward the eye and expands at its apex before reaching the eye. There is a small black spot on the margin before each eye. Pronotum with dark markings on the anterior portion. Posterior portion darker green. Scutellum with a dark marking on each side so as to form a pale spot in each basal angle; a broad basal light area and a pale spot on apex. Forewings dark green with a pale claval suture, costal margin pale and claval area generally paler with dark claval veins.

Genitalia: Female seventh sternite rather strongly angularly produced to a blunt apex. Male plates long, narrow, tapered to acute apices. Aedeagal processes both pointed. The anterior process narrowed to inner margin, the posterior process narrowed to posterior margin.

Holotype male and allotype female collected at Huachuca Mts., Arizona, July 28, 1907. Male and female paratypes from Huachuca Mts., Arizona, July 20, 1937, from Santa Rita Mts., Arizona, June 8, 1937, and from Patagonia, Arizona, September 3, 1938, collected by D. J. and J. N. Knull.

***Keonolla subrufa*, n. sp.**

Resembling *dolabrata* in general form but without dark color markings on crown and with distinct male genitalia. Length 6–6.5 mm.

Crown produced, blunt, about two-thirds as long at middle as basal width between the eyes.

Color: Rusty brown, crown with a black spot at apex. Ocelli black, a black line extending anteriorly from each ocellus to meet a curved line extending from front to disk. A small black dash just inside each ocellus. Pronotum with posterior portion darker. Scutellum with dark markings, forming several paler areas. Forewings dark brownish mottled with paler areas.

Genitalia: Female seventh sternite strongly produced on posterior margin. Male plates long, triangularly produced, tapered to acute tips. The pygofer bears a short spine at the caudal terminus of the dorsal margin. The two aedeagal processes are narrow and pointed at their apices; the posterior process is much longer than the anterior process.

Holotype male and paratype male collected at St. George, Utah, August 8, 1936, by E. W. Davis. Allotype female and male paratypes collected at Tucson, Arizona, September 29, 1929, by E. D. Ball. Male and female paratypes with typical markings are from Mexico City D. F., Mexico, September 13, 1939, D. M. DeLong, collector and from Cuernavaca, Morelos, Mexico, October 21, 1941. Others are from: Carapan, Michoacan, Mexico, October 2, 1941, Cordoba, Veracruz, Mexico, October 8, 1941, and Tres Cumbres, Morelos, Mexico, October 21, 1941, all collected by DeLong, Good, Caldwell and Plummer.

Keonolla subrufa signara n. subsp.

Resembling *subrufa* in structural characters but with distinct color markings. Length 6–6.5 mm.

Crown strongly produced, more than two-thirds as long as middle as basal width between the eyes.

Color: Crown reddish brown with a black spot at apex. A median pale stripe, bordered with black, extending from each side of apex to the black suture which extends forward from each ocellus. A median white stripe bordered by black extends forward from base two-thirds the length of the crown and terminates in a white cross band which extends between the two diagonal stripes. The pronotum and forewings are reddish brown mottled with small white spots. Scutellum black with pale markings.

Genital structures of both sexes similar to those of *subrufa*.

Holotype male, allotype female and male and female paratypes collected at Mazacian, Guerrero, Mexico, October 3, 1945, by DeLong, Balock and Hershberger. Paratypes from Mexico City, D. F. (Toluca Rd.), September 26, 1945, from Rio Tuxpan, Michoacan, Mexico, September 9, 1929, from Cuernavaca, Morelos, Mexico, September 25, 1945, all collected by DeLong, Plummer, Hershberger and Elliott, and also from Acapulca Rd., Mexico, November 22, 1938, collected by J. S. Caldwell.

This series of specimens is distinctly marked and is easily separated by color from the specimens of typical *subrufa*.

Keonolla torqua, n. sp.

Resembling *dolabrata* in general appearance but with a more

produced head and with distinct genitalia. Length male 5.25 mm; female 5.75 mm.

Crown produced and bluntly angled, a little wider between eyes at base than median length.

Color: Crown pale with a black spot at apex. A circular black ring on each side extends across margin to front and encloses a paler area. A pair of slender black longitudinal lines touches the ocelli and extends to base. A pair of short longitudinal black bars on basal half between ocelli. A dark spot next inner margin of each eye. Pronotum pale with dark markings. A black area near lateral margin just back of each eye. Disk usually pale with irregular dark markings either side. Scutellum pale, basal angles black and a pair of dark parenthesis marks longitudinally connected by a transverse line at middle. Forewings tinted with reddish brown, claval vein paler, black pigment areas from apex of scutellum to disk forming an oblique marking. Females darker in color.

Genitalia: Female seventh sternite bluntly, angularly produced on posterior margin. Male plates long and very narrow on apical half. Styles short, slender, apex blunt. Aedeagus with the two caudal erect processes narrowed on apical third. The posterior process longer, the anterior process bent caudally on apical third.

Holotype male collected at Mexico City, D. F., Mexico, September 13, 1939 by D. M. DeLong. Allotype female and male and female paratypes collected at Laguna de Zempoala, Morelos, Mexico, October 21, 1945, by DeLong, Plummer, Hershberger and Elliott. Male and female paratypes from Rio Prio, D. F., Mexico, October 7, 1941, and Cuernavaca, Mor., Mexico, October 21, 1941, collected by DeLong, Caldwell, Good and Plummer and from Desierto de los Leones, D. F., Mexico, October 9, 1945, collected by DeLong, Elliott and Hershberger.

***Keonolla curta*, n. sp.**

Resembling *dolabrata* in general form with different color markings and male genital structures. Length male 5.25 mm., female 6.5 mm.

Crown broad and bluntly produced, almost rounded, about three-fourths as long at middle as basal width between the eyes.

Color: Crown pale with dark markings. A black spot at apex and a black diagonal band extending from apex, half way to eye just above margin on either side. A pair of broad longitudinal dark bands extends from base through ocelli, converges and unites a little posterior to apex. A pair of slender, proximal longitudinal lines is between these on basal half. There is a pale brownish

blotch next each eye. Pronotum with disk and posterior portion dark, anterior area pale with light brownish spots. Scutellum appearing black except for two proximal circular areas just back of margin of pronotum, each containing a black central spot. Forewings dark with pale mottling.

Genitalia: Female seventh sternite with posterior margin angularly produced. Male plates long and slender, styles narrowed on apical half to pointed tips. Aedeagus short with two short erect processes on caudal portion. The basal portion has a pair of rather long, narrow, erect processes between which is a median, broader erect portion expanded at the base and tapered to form a narrow elongation on the dorsal third, caudad of the anterior pair.

The pygofers have long, narrow, dorsal spines which extend to two-thirds the length of the pygofers.

Holotype male collected at Rio Frio, D. F., Mexico, Km. 65, October 10, 1945, by DeLong, Hershberger and Elliott. Allotype female and paratype males and females collected as follows: Tuxpan, Michoacan, Km. 186, October 5, 1941, by DeLong, Plummer, Caldwell and Good; Tres Cumbres, Morelos, Mexico, October 21, 1941; Cuernavaca, Morelos, Mexico, October 21, 1941; Urapan, Michoacan, Mexico, October 1, 1941; Carapan, Michoacan, Mexico, October 2, 1941, all collected by DeLong, Good, Caldwell and Plummer; Zimipan, Hidalgo, Mexico, September 21, 1941 collected by Good, Caldwell and DeLong.

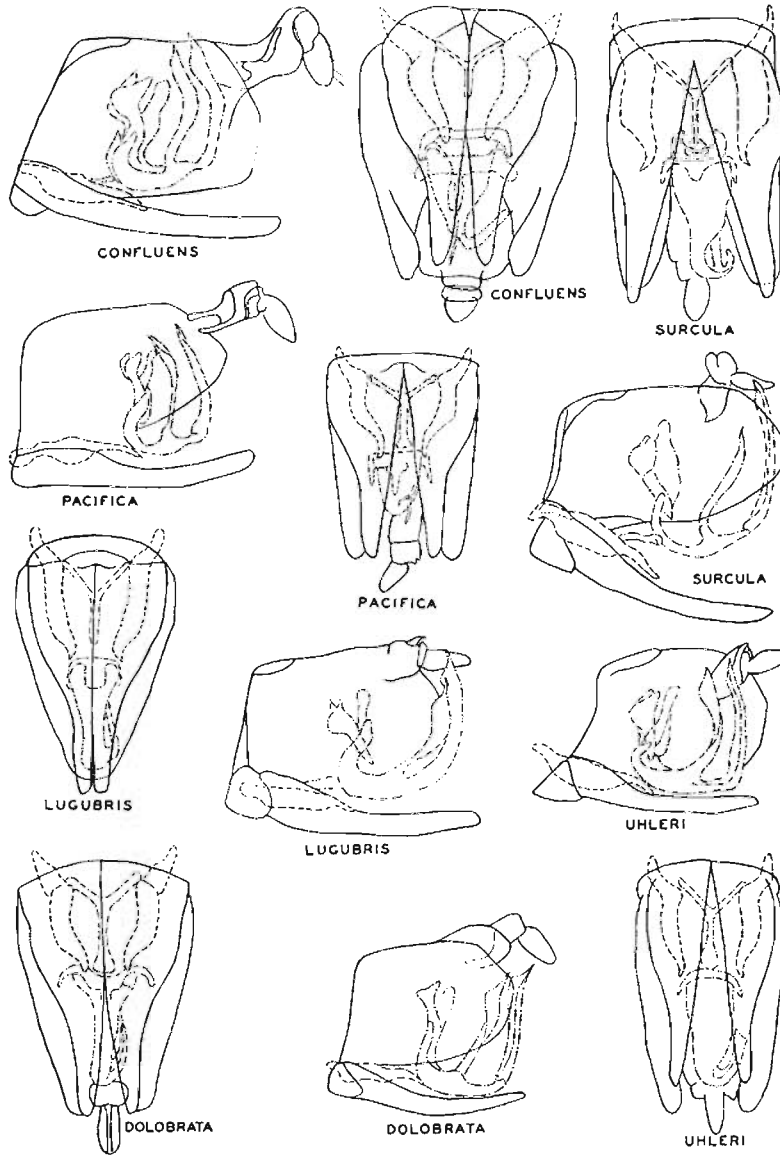
***Keonolla gemmella*, n. sp.**

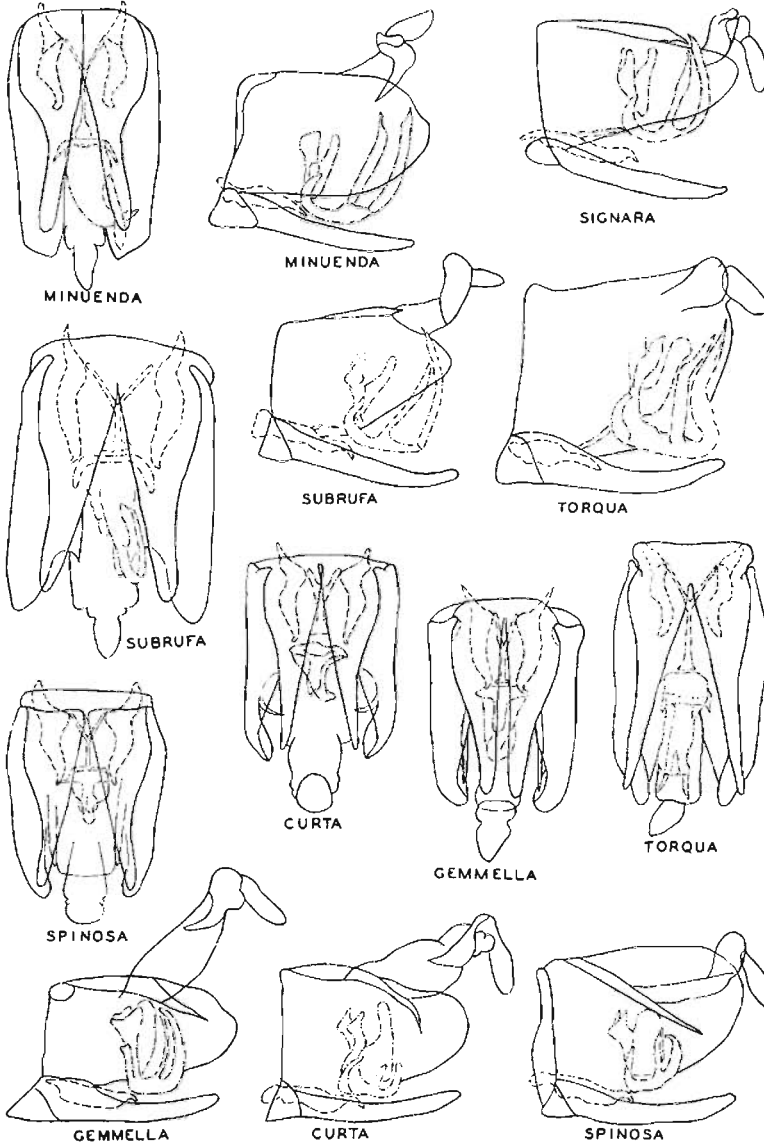
Resembling *curta* in form and general appearance but with different color markings and distinct male genitalia. Length male 5.5 mm, female 6 mm.

Crown angularly produced, one-third wider between eyes at base than median length.

Color: Crown yellow with a black spot at apex, a median spot just back of this and a pair of diagonal stripes extending halfway to eye on each side just above margin. These oblique stripes are connected to each ocellus by a narrow black line. A black, ovate, elongate ring occupies the basal three fifths of the crown on each side of middle. Pronotum with disk and basal portion green, the anterior and lateral margins yellowish, entire pronotum mottled with black. Scutellum yellow, basal angles black, a curved black line on each side extending from the base to apex. These are joined at each end and by a transverse black line across middle. Forewings green with dark veins, claval suture paler.

Genitalia: Female seventh sternite with posterior margin angu-





larly produced. Male plates long, tapered to pointed apices. Styles curved inwardly with apices pointed outwardly. Aedeagus with two erect processes on the caudal portion. The posterior of these is heavier and the anterior is more narrowed. The basal portion bears an erect process which is broader and longer. There is a heavy spine on each side on the dorsal portion of the pygofer which extends almost to the posterior margin of the pygofer.

Holotype male and allotype female collected at Cuernavaca, Morelos, Mexico, K-57, October 21, 1941, by DeLong, Plummer, Good and Caldwell. Paratype male collected at Laguna de Zempoala, Morelos, Mexico, October 21, 1945, by DeLong, Plummer, Hershberger and Elliott.

***Keonolla spinosa*, n. sp.**

Resembling *curta* in form and general appearance but with different genitalia. Length male 5.25, female 5.5 mm.

Crown produced and bluntly angled, a little wider between eyes at base than median length.

Color: Crown pale, mottled with pale brown. A black spot at apex. A pair of oblique lines extends from near apex above margin half way to eye on either side. A pair of dark spots anterior to middle between and proximal to the oblique lines. Pronotum paler on anterior and lateral margins, mottled with reddish brown. Scutellum marked as in *curta* with the two proximal spots just posterior to pronotum. Forewings brownish with darker brown areas.

Genitalia: Female seventh sternite with the posterior margin angularly produced. Male plates long, tapered to blunt apices. Styles narrowed from base to blunt tips. Aedeagus with a central portion and with three slender erect processes arising from the base. One is anterior, the other two are caudal and seem to arise together from the base. The anterior of these two is longer and straight, the posterior process is broader near the base and is curved anteriorly at the apex. The pygofer on each side bears a long dorsal spine which extends almost to the posterior margin of the pygofer.

Holotype male and paratype male collected at Rio Frio, D. F., Mexico, Km. 65, October 10, 1945, by DeLong, Hershberger and Elliott. Allotype female and male and female paratypes collected at Mexico City, D. F., Mexico, September 1, 1959, by D. M. DeLong. Paratype females from Zimipan, Hidalgo, Mexico, September 26, 1941, by DeLong, Good and Caldwell.