

## A NEW GENUS OF NEW WORLD TROPIDOCEPHALINI (HEMIPTERA: DELPHACIDAE: DELPHACINAE), WITH THE DESCRIPTION OF TWO NEW SPECIES<sup>1</sup>

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**ABSTRACT:** The genus *Procidelphax*, *gen. nov.*, is described to accommodate two unusual new Tropidocephalini, *P. depressa*, n. sp. and *P. dejecta*, n. sp., from Peru and Bolivia, respectively. *Procidelphax*, *gen. nov.*, is easily distinguished from all other New World Tropidocephalini by being strongly dorsoventrally flattened, and having the median carina of the frons broadly forked ventrad. The New World Tropidocephalini is briefly reviewed and a provisional key to the five genera provided.

**KEYWORDS:** Delphacidae, Auchenorrhyncha, Fulgoroidea, Fulgoromorpha, planthopper, Tropidocephalini, South America, new genus, new species

The delphacine planthoppers consist of three tribes, the largely Neotropical Saccharosydmini (3 genera, 9 species), the cosmopolitan Delphacini (approximately 268 genera, 1,569 species) (counts updated from Asche 1985) and the Tropidocephalini. The world diversity of Tropidocephalini is approximately 167 species in 31 genera, with most taxa feeding on bamboo (Poaceae: Bambusoideae) in tropical Asia. The New World Tropidocephalini is all Neotropical, consisting, until now, of only 18 described species in 4 genera [*Macrocorupha* Muir, 1926 (1 species, *M. gynerii* Muir, 1926), *Columbiana* Muir, 1919 (2 species, *C. lloydi* Muir, 1919, *C. carasi* Fennah, 1963), *Malaxa* Melichar, 1914 (3 species, plus 10 Indomalayan species) and *Columbisoga* Muir, 1921 (12 species, plus 1 Indomalayan)]. The type species of *Malaxa* (*M. acutipennis* Melichar, 1914) and *Columbisoga* (*C. campbelli* Muir 1921) are from the Philippines and South India respectively, and the assignment of New World taxa to these genera deserves reassessment. *Columbisoga*, as currently defined, is quite heterogeneous and probably deserves separation into several genera as undescribed forms are considered. *Liburniella ornata* (Stål, 1862) was reported from Ecuador in error as a tropidocephaline by Muir (1926: 8-9). *Liburniella ornata* is Nearctic and in the Delphacini (the calcar is without teeth, but a suspensorium is present). Specimens with a rounded "areolet" on the vertex (e.g., Fig. 1b) superficially similar to *Liburniella* have been observed that appear to be undescribed *Columbisoga*. Reported host plants for New World Tropidocephalini are provided in Table 1.

Most species are reported only from type material, although Asche (1985) provided illustrations of some taxa, including a male *Macrocorupha gynerii* (from Peru, type locality in Ecuador) which had previously been recorded from females. Tropidocephalini can be locally common at lights. Identification of species may be difficult because original species descriptions are often inadequate and there appear to be many new species, particularly in *Columbisoga* as currently defined.

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Table 1. Host plants for Neotropical Tropidocephalini. All host records and delphacid species described by Muir (1926).

Species of delphacid	Host plant	Plant higher taxon
<i>Columbisoga chusqueae</i>	<i>Chusquea</i> sp.	Poaceae: Bambusoideae
<i>Columbisoga gynerii</i>	<i>Gynerium</i> sp.	Poaceae: Gynerieae (Sanchez-Ken & Clark 2001)
<i>Columbisoga gyneriicola</i>	<i>Gynerium saccharoides</i> Humb. & Bonpl.	Poaceae: Gynerieae
<i>Columbisoga ornata</i>	<i>Gynerium</i> sp.	Poaceae: Gynerieae
<i>Columbisoga sacchari</i>	<i>Guadua</i> sp., <i>Saccharum</i> sp.	Poaceae: Bambusoideae, Panicoideae
<i>Columbisoga zapote</i>	<i>Manilkara zapota</i> (L.) P. Royen (as <i>Lucuma mammosa</i> C.F. Gaertn.)	Sapotaceae
<i>Macrocorupha gynerii</i>	<i>Gynerium sagittatum</i> (Aubl.) P. Beauv.	Poaceae: Gynerieae
<i>Malaxa occidentalis</i>	<i>Gynerium</i> sp.	Poaceae: Gynerieae

Tropidocephalini are characterized by a thickened calcar which is concave on the inner surface and the trailing margin lacks the teeth that are found on most other advanced Delphacidae. The central sperm conducting tube of the membranous aedeagus is within a sclerotized theca (forming a phallosheca, although it is usually less accurately referred to as the aedeagus in descriptive taxonomy). The phallosheca and anal segment are in close functional contact, with the base of the phallosheca mostly integrated into the ventral side of the anal segment. The base of the phallosheca is usually asymmetrically twisted, bearing at least one slender process arising from the base (Asche 1990).

A new genus with two new species is described herein. In the new genus, the base of the phallosheca appears essentially symmetrical and there is no slender process from the base of the phallosheca, but it otherwise fits this definition, and is assigned to this tribe. A preliminary key to New World genera of Tropidocephalini is provided, since no keys were previously available, although this key may soon require modification if *Malaxa* or *Columbisoga* are revised or new genera described.

## METHODS

The morphological terminology follows Asche (1985), but 'segment 10' is used instead of 'anal tube'. For descriptive purposes the parameres will be referred to as having a proximal 'basal angle', and distal 'inner', and 'outer angles' (*sensu* Metcalf 1949). 'Aedeagal complex' is used descriptively for the phallosheca, connective, parameres, and postgenital segments when these structures have been

separated from the pygofer. 'Phallosome' is here used instead of the morphologically less accurate 'aedeagus' to acknowledge the fusion of the true aedeagus with the theca. The heading 'genitalia' should be understood to refer to males and include the terminal segments. Wing venation (Fig. 2) follows Kukalová-Peck (1978) as interpreted by Dworakowska (1988). Nomenclature of the carinae of the vertex (Fig. 3) is as treated by Bartlett (2006) following Yang and Yang (1986). The collections from which specimens were examined or deposited are abbreviated as follows (following Arnett et al., 1993):

MUSM – Colección del Departamento De Entomología, Museo de Historia Natural, Universidad Nacional Mayor De San Marcos, Lima, Peru.

NCSU – North Carolina State University, Department of Entomology, Insect Museum, Raleigh, NC.

UDCC – University of Delaware, Department of Entomology and Wildlife Ecology, Insect Reference Collection, Newark, DE.

USNM – US National Museum of Natural History, Smithsonian Institution, Washington, DC.

Diagnostic descriptions are provided for all included species. Measurements reported are averages (in millimeters, with "n" indicated) with standard deviation as appropriate. Total body length was measured in dorsal view from the anterior tip of the frons to the posterior tip of segment 10 (i.e., excluding the 'anal tube') and body width was measured at the tegulae. The ratio of length:width (L:W) of the vertex was calculated individually for specimens and averaged to report a mean. To calculate the ratio, the length of the vertex was measured along the midline and the width of the vertex near midlength.

Reported specimen data follows the format of the specimen label, with added notes in square brackets. Label information for primary types is quoted, with each line break indicated by "/" and each label separated by "/". All specimens are macropterous.

Photographs and measurements were taken using a Nikon SMZ-1500 Digital Imaging Workstation with Nikon DS-U1 digital Camera and NIS Elements Imaging software (version 3.0).

## SYSTEMATIC ENTOMOLOGY

### Provisional key to genera of New World Tropidocephalini

1. Vertex much (ca. 1.5x) longer than broad (Fig. 1c), rounded anteriorly in dorsal view; median carina of vertex unbranched .....*Macrocorupha*  
- Vertex shorter, more truncate anteriorly; median carina of vertex variable....2
2. Antennae very long (Fig. 1d), exceeding posterior margin of mesothorax .....*Malaxa*  
- Antennae not as long, not exceeding mesothorax .....3
3. Body strongly flattened (Figs. 5c, 6c); frons rather square, median carinae of frons forked ventrally near lower margin of eyes (Figs. 5b, 6b) .....*Procidelphax n. g.*

- Body not flattened; frons rectangular, median carinae not forked, except dorsally near fastigium in some species .....4
- 4. Median carinae of vertex weak, not forked; lateral carinae of pronotum reaching hind margin (Fig. 1b) .....*Columbisoga*
- Median carinae of vertex strong and forked, forming “Y”; lateral carinae of pronotum not attaining hind margin (Fig. 1a) .....*Columbiana*

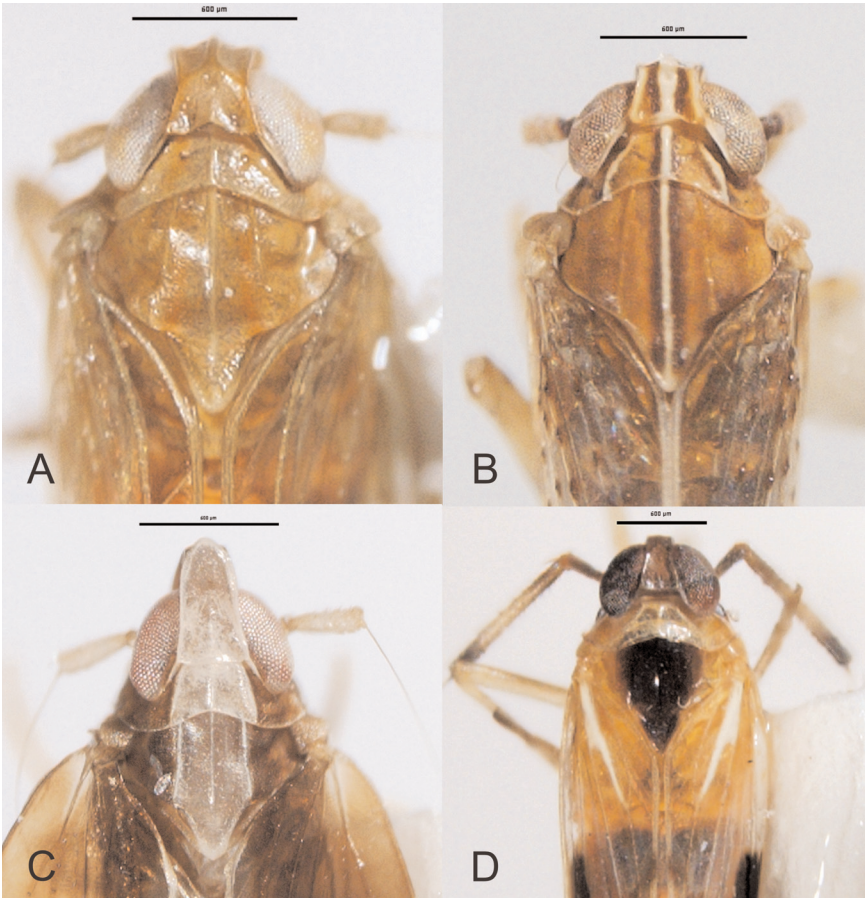


Figure 1. Dorsal view of head and thorax of New World genera of Tropidocephalini (scale = 0.5 mm). A. *Columbiana* sp. (Columbia), B. *Columbisoga* sp. (Peru), C. *Macrocorupha* sp. (Columbia), and D. *Malaxa* sp. (Costa Rica). All specimens appear to be undescribed species [*Macrocorupha* sp. does not match Ashe (1985: figs. 611, 624, 635)]. Scales represent 600  $\mu$ .

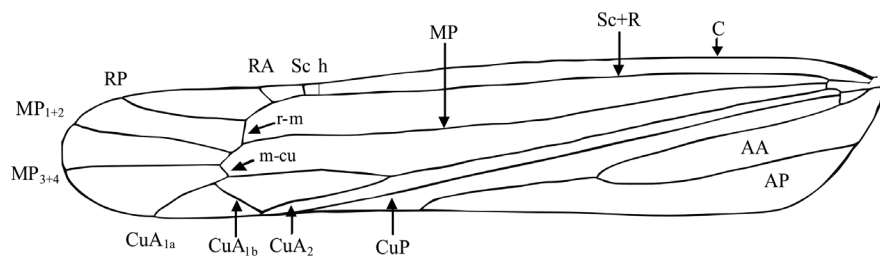


Figure 2. Forewing venation of *Procidelphax depressa* n. sp. following Dworakowska (1988). Abbreviations: AA = Anterior Anal, AP = Posterior Anal, C = Costa, CuA = Anterior Cubitus, CuP = Posterior Cubitus, h = humeral crossvein (frequently obsolete), m-cu = m-cu crossvein, MP = Posterior Media (Anterior Media absent), r-m = r-m crossvein, RA = Anterior Radius, RP = Posterior Radius; Sc = Subcosta.

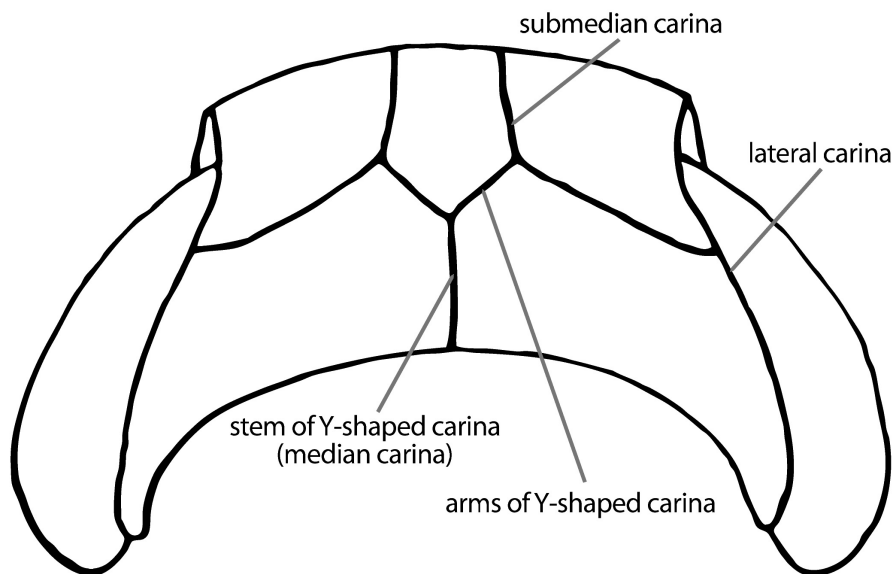


Figure 3. Head of *Procidelphax depressa* n. sp. showing nomenclature of head carinae.



Figure 4. Calcar of *Procidelphax dejecta* n. sp.

### *Procidelphax*, New Genus

**Type species.** *Procidelphax depressa*, New Species.

**Diagnosis.** Body strongly dorsoventrally flattened (Figs. 5a, c; 6a, c). Vertex in dorsal view two-thirds as long as wide, rather quadrate, narrowing slightly anteriorly to broadly rounded apex. Median carina of vertex present, forked near anterior margin of eyes, arms of fork diverging strongly (angle  $\sim 100^\circ$ ) to meet submedian carinae (Fig. 3). Submedian carinae arising from lateral carinae near anterior margin of eyes, directed transversely to arms of Y-shaped carina (dividing vertex into posterior and anterior compartments), then angled anteriorly, converging slightly, terminating at fastigium. Fastigium in lateral view sharp, angulate ( $\sim 95^\circ$  angle), carinate. Frons nearly square (Figs. 5b, 6b), median carina conspicuous, divided at lower level of eyes, arms strongly diverging to reach lateral carinae of frons near frontoclypeal suture. Clypeus peltate, often with fine, diagonally transverse striae. Rostrum short, reaching mesocoxae. Eye emarginate ventrocaudally to accommodate antennae, in dorsal view eyes posteriorly exceeding vertex. Subantennal suture arising near anterior margin of antennae, sinuate, reaching lateral carinae of frons near arms of median carinae. Lateral ocelli anteroventrad of compound eyes. Antennae terete with scape short, pedicle about twice length of scape bearing a group of sensillae on distal posterior margin. Pronotum trapezoidal, broader posteriorly, posterior margin concave; with median and pair of lateral carinae, diverging posteriorly. Forewing (Fig. 2) with crossveins in apical third, humeral crossvein faintly indicated or absent; Sc, RA and RP unbranched, MP 2-branched, CuA 3-branched (into  $CuA_{1a}$ ,  $CuA_{1b}$  and  $CuA_2$ ); CuP unbranched, and anal veins fused in distal half of clavus, fused anal veins reaching trailing margin of wing before apex of clavus (i.e., clavus closed). Legs with femora slightly flattened, spination of apex of hind leg 5 (3+2) (tibia), 6 (4+2) (basitarsus), 4 (2nd tarsomere). Metatibiae with 1 lateral tooth near tibiofemoral articulation. Calcar (Fig. 4) flattened, rather thick, tectiform, nearly as long as basitarsus, bearing scattered setae and a single, subapical black tooth on trailing margin. Wings weakly tecti-



form over abdomen at rest. Pygofer in lateral view much taller than wide, dorso-caudally angled; in caudal view about as wide as long, lateral margins rounded; diaphragm weak without apparent armature. Parameres rather flattened, lateral margins sinuate, proximally diverging and distally converging; basal angle weak, inner and outer angles rounded. Phallosome (aedeagus) strongly arched ventrally, bearing large flagellum; base symmetrical, suspensorium absent, phallosome attached and partially embedded in ventral margin of segment 10. Segment 10 small, without processes.

**Remarks.** The flattened form and the branched median carina of the frons in this genus are unique among New World Delphacidae. The body form is superficially similar to the Old World genus *Eumetopina* Breddin, 1896 (Delphacini), the only other genus that I am aware of that is similarly flattened. No host data is available for *Procidelphax*. All available specimens have been collected at lights, and are male.

**Etymology.** An arbitrary combination of letters derived from the truncation of “*procido*” (or “*prociduus*” Latin, prostrate, to fall flat) with *Delphax* (referring to the type genus, derived from the Greek *delphax* (small pig)). The generic name is female in gender.

#### Key to species of *Procidelphax*

1. Vertex and pronotum brown, posterior margin of pronotum deeply sinuate; frons brown above fork of median carinae; flagellum bearing two processes, one strongly deflexed .....*dejecta*
- 1' Vertex paler posteriorly, pronotum mostly pale, posterior margin shallowly sinuate; frons mostly pale with dark median arch; flagellum bearing three processes .....*depressa*

#### *Procidelphax depressa*, new species

(Figures 2, 3, 5)

**Type Locality.** Tingo Maria, Huánuco District, Peru.

**Description. Color.** Overall body color dark brown dorsally, prothorax and tegulae paler; light brown to stramineous ventrally; vertex dark brown, variably paler posteriorly, median pale spots in foveae of median and posterior compartments; frons pale with dark inverted “U” marking; legs stramineous with femora paler than tibiae; forewings infusate on proximal half.

**Structure.** Length male (n=5)  $3.13 \pm 0.58$ , width  $0.77 \pm 0.14$ ; female not observed. Head just narrower than prothorax, vertex broadening posteriorly; ratio vertex (n=5) L:W  $0.69 \pm 0.03$ . Head slightly deflexed relative to thorax. Vertex weakly concave posteriorly. Prothorax trapezoidal with posterior margin concave. Carinae of prothorax reaching posterior margin, lateral carinae curving laterad posteriorly. Carinae of mesothorax reaching posterior margin, lateral carinae diverging posteriorly. Femora flattened, tibiae very slightly flattened. Calcar ca. 3/4 length basitarsus. Pygofer in lateral view rather narrow, inclined forward dorsally; in caudal view pygofer widest in dorsal third, opening about as wide as long, lateral margins rounded; diaphragm weak. Parameres flattened, lateral margins sinuate, medial margin with acuminate tooth directed cephalad; diverging in proximal 2/3, con-

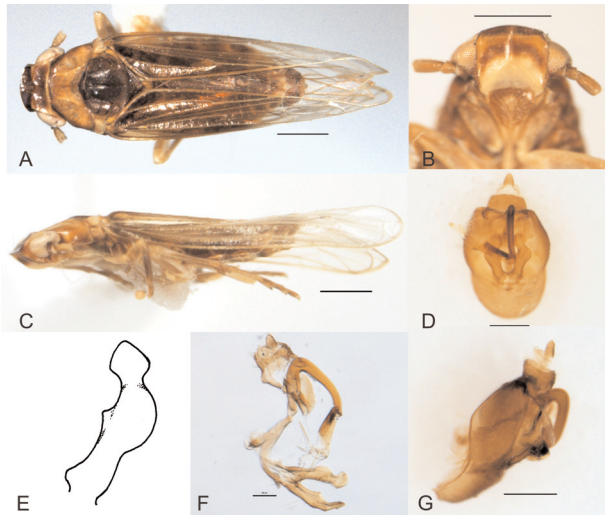


Figure 5. *Procidelphax depressa* n. sp. [Paratype, scale = 0.5 mm (A-C), 0.2 mm (D, G), 0.1 mm (F)]. A. dorsal view, B. frons, C. lateral view, D. pygofer, caudal view, E. right paramere, widest view, F. aedeagal complex, G. pygofer, lateral view.

verging distally to dorsolaterally projecting broad apices, widest at inflection. Phallotheca flattened, strongly curved ventrad; apex bearing very large flagellum, slightly curved, proximally sclerotized, becoming broader and membranous distally, apex bearing a series of teeth and three mobile processes, one short, one long awl-like, and one large and cultrate bearing large irregular jagged teeth along one margin. Segment 10 small, processes absent.

**Remarks.** *Procidelphax depressa* can be separated most readily from *dejecta* by the pale markings on the prothorax, tegulae, and above the fork of the median carina on the frons, which are dark on *dejecta*. *Procidelphax depressa* also have parameres that are narrower at their widest point; however, the most definitive feature is the three processes on the apex of the flagellum, compared with two in *dejecta*, with one strongly deflexed.

**Distribution.** Peru (Huánuco District).

**Etymology.** Specific epithet derived from “*depressus*” (Latin, pressed down, low, flat) with a female termination.

**Material Examined.** Holotype: “Peru, Huanuco/Tingo Maria/17-VIII-1985/JFCornell, UVLight // [red paper] HOLOTYPE / *Procidelphax depressa* Bartlett” (1m, USNM). Paratypes: same as holotype (28 males UDCC, 3 males NCSU, 3 males MUSM, 3 males USNM); same except 11-12-VIII-1985 (21 males, UDCC).

### *Procidelphax dejecta*, New Species

(Figure 4, 6)

**Type Locality.** Potrerillos del Guenda Preserva Natural, Santa Cruz District, Bolivia.



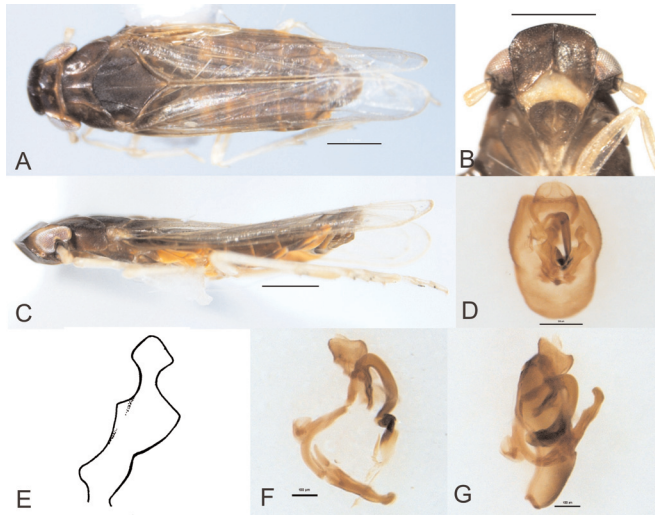


Figure 6. *Procidelphax dejecta* n. sp. [Paratype, scale = 0.5 mm (A-C), 0.2 mm (D, G), 0.1 mm (F)]. A. dorsal view, B. frons, C. lateral view, D. pygofer, caudal view, E. right paramere, widest view, F. aedeagal complex, G. pygofer, lateral view.

**Description. Color.** Overall body color dark brown dorsally, including vertex and prothorax; paler ventrally, legs uniformly stramineous. Vertex with pale spots in foveae of median and posterior compartments; frons dark brown dorsad of fork of median carina, stramineous between fork and frontoclypeal suture; forewings infusate proximally.

**Structure.** Length male (n=1) 3.4, width 0.88; female not observed. Head just narrower than prothorax, vertex broadening posteriorly; ratio vertex (n=1) L:W 0.63. Head slightly deflexed relative to prothorax. Vertex weakly angulate posteriorly. Prothorax trapezoidal with posterior margin strongly concave. Carinae of prothorax reaching posterior margin, lateral carinae curving laterad posteriorly. Carinae of mesothorax reaching posterior margin, lateral carinae diverging posteriorly. Femora flattened, tibiae very slightly flattened. Calcar ca. 3/4 length basitarsus. Pygofer in lateral view rather narrow, inclined forward dorsally; in caudal view pygofer widest near middle, opening slightly longer than wide, lateral margins rounded; diaphragm very weak. Parameres flattened, lateral margins sinuate widest above middle, median margin bearing acuminate tooth projecting cephalad; diverging in proximal 2/3, converging distally to blunt dorsolaterally projecting apices. phallosheath shaft flattened, strongly curved ventrad; apex bearing very large curved flagellum, proximally sclerotized, becoming membranous distally, apex bearing two processes, one long cultrate process bearing scattered teeth along one margin, a second strongly deflexed process bearing scattered teeth on outer margin. Segment 10 small, processes absent.

**Remarks.** This species was described based on two specimens, the paratype unfortunately damaged through inadvertent mishandling by the author.

**Distribution.** Bolivia (Santa Cruz District).

**Etymology.** Specific epithet derived from “*dejectus*” (Latin, sunk down, low, dispirited) with a female termination.

**Material Examined.** Holotype “BOLIVIA Santa Cruz dist./Potrerillos del guenda/Preserva Natural 370m/17°40'S 63°27'W 1-4.x.2007/Wappes&Morris; EX: BL/MV // [red paper] HOLOTYPE / *Procidelphax* / *dejecta* Bartlett” (1 male, USNM). Paratype: same data (1 male, UDCC).

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