

Review of the Neotropical genus *Paraphidnia* (Orthoptera: Tettigoniidae: Phaneropterinae)

Обзор неотропического рода *Paraphidnia* (Orthoptera: Tettigoniidae: Phaneropterinae)

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The genus *Paraphidnia* Giglio-Tos, 1898 belonging to the tribe Dysoniini is divided into two subgenera: *Paraphidnia* s. str. and *Anaphidna* **subgen. nov.** The nominotypical subgenus contains only *P. gallina* Giglio-Tos, 1898. *Paraphidnia verrucosa* (Brunner von Wattenwyl, 1878) and *P. lankesteri* Rehn, 1918 are included in the new subgenus together with twelve new species: *P. mexicana* **sp. nov.** (type species of *Anaphidna*), *P. peruana* **sp. nov.**, *P. svetlanae* **sp. nov.**, *P. bezverkhovi* **sp. nov.**, *P. polestshuki* **sp. nov.**, *P. graciela* **sp. nov.**, *P. quirozi* **sp. nov.**, *P. silvai* **sp. nov.**, *P. osae* **sp. nov.**, *P. hernandezi* **sp. nov.**, *P. rubricorpus* **sp. nov.**, and *P. rhinoceros* **sp. nov.** The new subgenus and all the new species are described and illustrated.

Род *Paraphidnia* Giglio-Tos, 1898, относящийся к трибе Dysoniini, подразделен на два подрода: *Paraphidnia* s. str. и *Anaphidna* **subgen. nov.** Номинативный подрод содержит только *P. gallina* Giglio-Tos, 1898. *Paraphidnia verrucosa* (Brunner von Wattenwyl, 1878) и *P. lankesteri* Rehn, 1918 включены в новый подрод вместе с двенадцатью новыми видами: *P. mexicana* **sp. nov.** (типовой вид *Anaphidna*), *P. peruana* **sp. nov.**, *P. svetlanae* **sp. nov.**, *P. bezverkhovi* **sp. nov.**, *P. polestshuki* **sp. nov.**, *P. graciela* **sp. nov.**, *P. quirozi* **sp. nov.**, *P. silvai* **sp. nov.**, *P. osae* **sp. nov.**, *P. hernandezi* **sp. nov.**, *P. rubricorpus* **sp. nov.** и *P. rhinoceros* **sp. nov.** Новый подрод и все новые виды описаны и проиллюстрированы.

Key words: katydids, taxonomy, Neotropics, Orthoptera, Tettigoniidae, Phaneropterinae, Dysoniini, *Paraphidnia*, new taxa

Ключевые слова: кузнечики, таксономия, Неотропики, Orthoptera, Tettigoniidae, Phaneropterinae, Dysoniini, *Paraphidnia*, новые таксоны

INTRODUCTION

This paper is a continuation of the review of the Neotropical tribe Dysoniini started by the first coauthor (Cadena-Castañeda, 2011, 2012) and of the series of papers on taxonomy of American Tettigoniidae published by the second coauthor (Gorochov, 2012a, 2012b).

Until now, the genus *Paraphidnia* has included only three species: *P. gallina* Giglio-Tos, 1898 (type species) from Ecuador; *P.*

lankesteri Rehn, 1918 from Costa Rica; *P. verrucosa* (Brunner-Wattenwyl, 1878) from Brazil. The taxonomic history of *Paraphidnia* began after the description of *Aphidnia verrucosa* by Brunner von Wattenwyl (1878). This species was described from a female (its male is still unknown) and included in the genus *Aphidnia* Stål, 1874 incorrectly mentioned by Brunner von Wattenwyl as *Aphidnia*. Later Giglio-Tos (1898) proposed the genus *Paraphidnia* with the

only species *P. gallina*, described from two males in the same paper; he also indicated the differences of his genus from Stål's one. Kirby (1906) established that *Aphidna* was a junior synonym of *Dysonia* White, 1862 and transferred *A. verrucosa* to the genus *Paraphidnia*. Finally, Rehn described *P. lankesteri* from a single male (Rehn, 1918) and prepared a key for the genera of Dysoniini including *Paraphidnia* (Rehn, 1950: Dysoniae). After that, the genus has not attracted the attention of orthopterists in spite of its being insufficiently studied.

Here, twelve new species of *Paraphidnia* are described. All these species are very similar to *P. lankesteri* by the armament of hind femora and structure of male cerci. Probably *P. verrucosa* is also closely related to these species. But *P. gallina* has very different male cerci; this difference does not allow its male to use these cerci (specialised for the fixation of female during copulation) in the same manner as in the other congeners. Thus *P. gallina* and all the other species clearly belong to different supraspecific taxa. However, these taxa have some general characters allowing us to consider them as two subgenera of the same genus.

MATERIAL AND METHODS

This research is based on field observations of the first co-author and on material deposited at the following institutions: Zoological Institute of the Russian Academy of Sciences, St Petersburg, Russia (ZIN); Museo de Historia Natural de la Universidad Distrital Francisco José de Caldas, Bogotá, Colombia (MUD); Instituto Nacional de Biodiversidad, Santo Domingo de Heredia, Costa Rica (INBio). Most of the specimens studied were collected in tropical forests at light, but some specimens, camouflaged under bryophytes and under lichens of the family Lobariaceae, were found living in trees.

The photographs of body parts of these insects were made with Sony α300 and Canon 40D cameras as well as with Leica M216.

Most of measurements are given in the usual manner (from the base to the apex), but some of them are defined as follows: *length of body*, distance from the frons to the abdominal apex excluding ovipositor; *length of body with wings*, distance from the frons to the apex of hind wings; *length of pronotum*, maximal distance between the anterior and posterior pronotal margins; *length of male subgenital plate*, distance from its base to its apex excluding styli; *length of ovipositor*, distance from the subgenital plate apex to the ovipositor apex.

TAXONOMIC PART

Order ORTHOPTERA

Family TETTIGONIIDAE

Subfamily PHANEROPTERINAE

Tribe DYSONIINI

Genus *Paraphidnia* Giglio-Tos, 1898

Type species: *Paraphidnia gallina* Giglio-Tos, 1898.

Note. The type species is insufficiently studied, and it belongs to the monotypical subgenus *Paraphidnia* s. str. All the other congeners strongly differ from *P. gallina* but similar to each other. They are here included in the new subgenus described below. Some of its diagnostic characters allow us to propose that it may be a separate genus. However, these supraspecific taxa have at least a few common characters: the head surface is somewhat rugose and/or granulate, with a rather large but low and apically rounded tubercle on each gena near the posteroventral corners of epicranium; the upper rostral tubercle forms a longitudinal crest; this crest is compressed from sides, rather high or with a more or less high posterior denticle (Figs 1–12, 69–77, 88–101); the antennal flagellum has distinct sparse and not very small inflations with numerous short setae (Figs 38, 41, 45, 77); the pronotum has a more or less deep transverse fold in the anterior half, and its hind lobe

is rather short and somewhat erected, separated from the lateral lobes by a pair of distinct posterolateral notches situated above (not behind) the hind parts of these lobes (Figs 13–17, 69–87, 109–117); the tegminal surface is somewhat crumpled, having the texture more or less adapted for imitation of tree bark with bryophytes and/or lichens; the mirror of left (upper) tegmen rather weakly distinct (its membrane with irregular veinlets, and its shape angularly elongate; Figs 48, 50, 52, 54, 56, 78–87); the legs have many of the spines widened and lamellar, similar to those of the genus *Dysonia* (including the trend for a strong increase of the distal outer spine of hind femora); the abdominal tergites have rather large and more or less inflate tubercles. So, at present it is reasonable to consider the above-mentioned taxa as two subgenera of the same genus *Paraphidnia* s. l.

Subgenus *Anaphidna* Gorochov et Cadena-Castañeda, **subgen. nov.**

Type species: *Paraphidnia* (*Anaphidna*) *mexicana* **sp. nov.**

Diagnosis. Lower rostral tubercle low, rounded at apex, slightly narrower than basal half of scape, and with large median ocellus anteriorly; upper rostral tubercle (= crest) divided into three denticles (anterior one low and thin, with narrow median groove and narrowly rounded apices; middle one also low and with similar groove, but distinctly thicker, rounded or obtuse in profile, and having large lateral ocelli on lateral sides; posterior denticle higher and diverse in shape; Figs 1–12, 69–76, 88–101, 109–117); first and second proximal segments of antennae or only second one with finger-like process on medial part (Figs 110, 111). Pronotum with one tubercle on central part of each lateral lobe and a few tubercles on disc (latter tubercles rather strongly varied in height, and some of them sometimes almost indistinct; Figs 13–17, 69–76, 78–84, 86, 87, 109–117). Fore coxa with short (almost tubercle-like) spine;

middle and hind femora with widened and lamellar ventral spines; two of them (situated most distally on outer side of hind femur) fused together and forming large lobe-like (strongly widened) spine having smaller additional lobule on distal edge (Figs 28, 32, 36); fore tibia with strongly widened tympanal area; middle and hind tibiae with widened and lamellar spines on both sides of dorsal surface (Figs 19, 21, 23, 25, 27, 28, 30, 32, 34, 36). Tegmina long, with two branches on *RS*; in male, stridulatory vein of left tegmen rather short (Figs 102–108), and mirror of right (lower) tegmen similar to that of left (upper) tegmen in structure but with less distinct irregular veinlets (Figs 49, 51, 53, 55, 57); hind wings significantly longer than tegmina and with texture of distal part of costal lobe more or less similar to that of tegmina (Figs 38–47). Last abdominal tergite in male with shallow and wide posteromedian notch; epiproct of male moderately large, flat, oval in distal half (but having almost angular apex), and with width and length almost equal; male cerci with rather long and spine-like outer lobe (this lobe curved upwards and having acute apex), and with rather long and partly lamellar inner lobe (this lobe movable in relation to outer lobe and having two projections: rather long and acute upper one, and shorter lower projection provided with a few very small apical hooks; Figs 58, 60, 61, 63, 65, 67, 121–128); male subgenital plate elongate (but not long and not large), with distinct posteromedian notch and thin and moderately long styles (Figs 59, 62, 64, 66, 68, 129–135); ovipositor short and strongly curved upwards (Figs 118–120).

Included species. Type species; *P. verrucosa*; *P. lankesteri*; *P. peruana* **sp. nov.**; *P. svetlanae* **sp. nov.**; *P. bezverkhovi* **sp. nov.**; *P. polestshuki* **sp. nov.**; *P. graciellae* **sp. nov.**; *P. quirozi* **sp. nov.**; *P. silvai* **sp. nov.**; *P. osae* **sp. nov.**; *P. hernandezii* **sp. nov.**; *P. rubricorpus* **sp. nov.**; *P. rhinoceros* **sp. nov.**

Comparison. The new subgenus differs from the nominotypical subgenus in the posterior denticle of upper rostral

crest much thinner or smaller (spine-like or lobule-like, but not shaped as high and rather long keel) and the other denticles of this crest low (for comparison see Figs 1–12, 69–76, 88–101, 109–117 and Fig. 77), presence of distinct pronotal tubercles (*vs.* pronotum without any tubercles; for comparison see Figs 13–17, 69–76, 78–84, 86, 87, 109–117 and Figs 77, 85), fusion of two distal outer spines of hind femora, and male cerci divided into two lobes almost equal in length and movable in relation to each other (in *Paraphidnia* s. str., these cerci are undivided, with the distal part long and medially curved, and with the proximal part having a small spine-like medial process immovable in relation to the rest of cercus).

Etymology. This name is derived from the Greek prefix “*ana-*” (un-, in-) and the former genus *Aphidna*.

Paraphidnia (Anaphidna) mexicana

Gorochov, **sp. nov.**

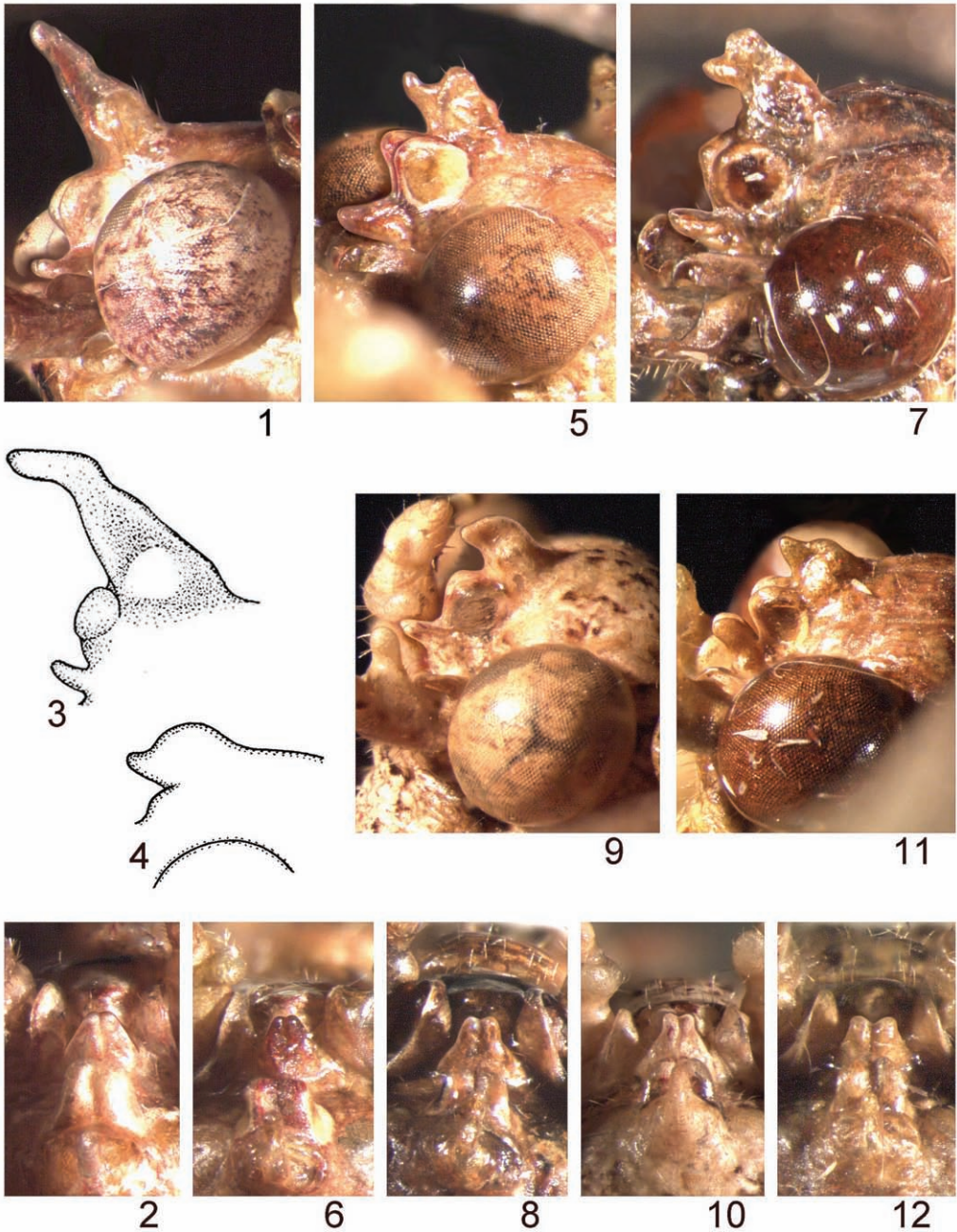
(Figs 1, 2, 13, 18, 19, 28, 29, 38, 39, 48, 49, 58, 59)

Holotype. Male; **Mexico**, Chiapas, north-eastern part of this state, Ocosingo Distr., Selva Lacandona between Montes Azules Biosphere Reserve and Bonampak Natural Monument (near border with Guatemala), environs of Lacanja-Chansayab Vill., primary forest, at light, 20–27 May 2007, coll. M. Berezin, E. Tkatsheva (ZIN).

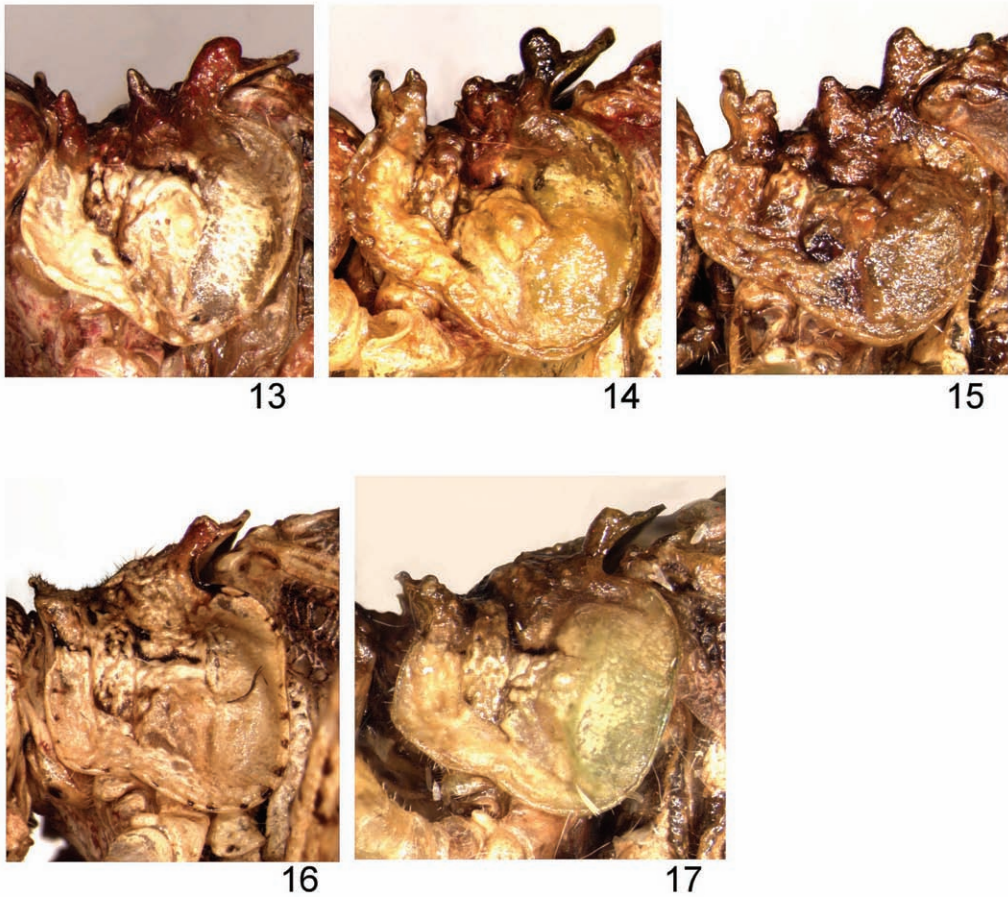
Description. Male (holotype). Colouration yellowish with following numerous marks: epicranium light brown with reddish tinge, whitish ocelli, a few small dark brown spots on face (one under median ocellus, a pair of spots near eyes and ventrolateral part of antennal cavities, a pair of spots near lateral corners of clypeus, and a pair of spots on middle part of clypeus), and more or less yellowish genae; antennae with light brown proximal part having reddish tinge on two proximal segments and numerous small reddish spots on flagellum (this flagellum also with two small yellowish spots), with reddish brown middle part (distal part of flagel-

lum missing) having sparse small yellowish spots, and with numerous dark brown setae on inflations of flagellum; mouthparts with reddish tinge on clypeus and upper half of labrum as well as reddish marble pattern on mandibles and palpi; pronotum with light brown disc and narrow upper part of lateral lobes (lateral part of this light brown area with reddish tinge, anterior part of this area with a few small lighter and darker spots along anterior edge of disc, and hind part of this area mainly reddish brown); legs with numerous light brown areas on fore and middle femora and on proximal half of hind femora, with numerous reddish spots on distal half of hind femora and on all tibiae, with small dark brown spots on inner side of fore femora (only one spot not far from femoral base) and on outer side of middle femora (one spot near femoral apex, and 3–4 spots on ventral outer keel), with almost blackish marks on outer and dorsal surfaces of proximal half of hind femora, with almost reddish brown tarsi having last segment light brown and with yellowish spot near base, and with darkened thin spines as well as distal parts of apical spurs and of lamellar widened spines on all legs; tegmina transparent with most veins and veinlets yellowish, with some veinlets of proximal and distal tegminal parts reddish brown, with some veins and veinlets between these tegminal parts almost dark brown, and with apical area whitish (this area with small darkened marks; Fig. 38); hind wings transparent but with apical area of costal lobe almost whitish as well as with subapical one brownish and having darker (brown) spot (Fig. 39); abdomen with small brown and dark brown spots on ventrolateral parts of most tergites, on median part of 3 distal tergites, and at base of epiproct (apices of cercal lobes also darkened).

Median ocellus almost as wide as long; apex of anterior denticle of upper rostral crest narrow and practically not bifurcate (Fig. 2); middle denticle of this crest widely rounded in profile; posterior denticle of this crest high, spine-like, and with apical part rather thin and directed upwards; Fig. 1);



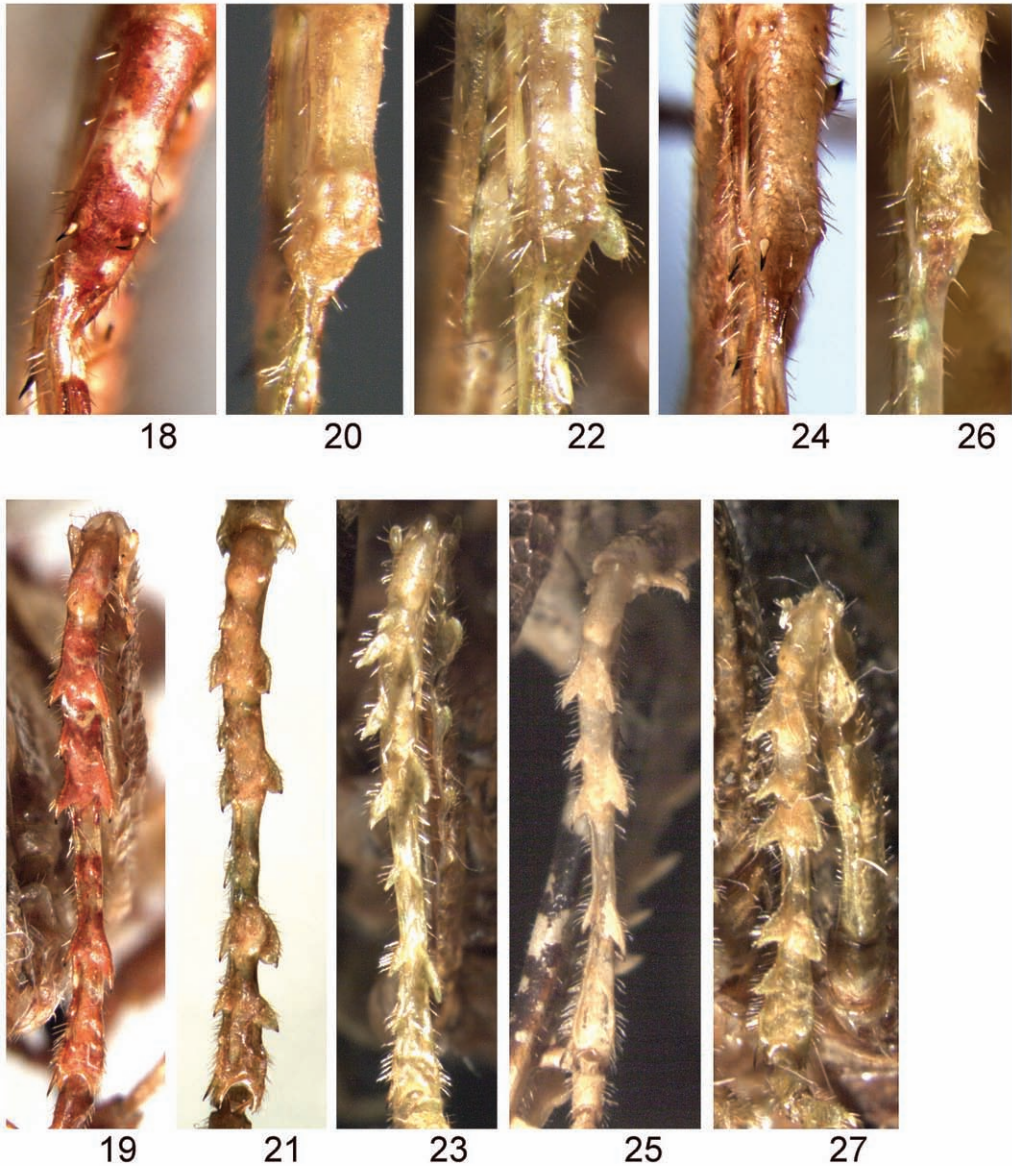
Figs 1–12. *Paraphidnia*, male: 1, 2 – *P. mexicana* sp. nov.; 3 – *P. lankesteri*, holotype; 4 – *P. verrucosa*, holotype; 5, 6 – *P. peruana* sp. nov.; 7, 8 – *P. svetlanae* sp. nov.; 9, 10 – *P. bezverkhovi* sp. nov.; 11, 12 – *P. polestshuki* sp. nov. Denticles of upper rostral crest from side (1, 3), and from side and slightly above (5, 7, 9, 11); anterior denticle of upper rostral crest from above and slightly in front (2, 6, 8, 10, 12); posterior denticle of this crest from side (4). [3, after Rehn (1918); 4, after Eades et al. (2012)].



Figs 13–17. *Paraphidnia*, male pronotum from side: **13** – *P. mexicana* sp. nov.; **14** – *P. peruana* sp. nov.; **15** – *P. svetlanae* sp. nov.; **16** – *P. bezverkhovi* sp. nov.; **17** – *P. polestshuki* sp. nov.

each of two proximal antennal segments with medial process. Pronotal disc with a pair of moderately high tubercles near anterior edge, a pair of somewhat higher (spine-like) tubercles on middle part, and a pair of thick rounded but not high tubercles on lateroproximal parts of hind lobe; outer surface of lateral lobes clearly granulated along ventral edge (Fig. 13). Fore femur with shagreen inner surface, three short and inarticulate inner ventral spines in distal half, two inner apical spinules, and rather high outer ventral keel; middle femur with three short and inarticulate outer ventral spines (these spines widened and lamellar; distal one rather large), two outer apical spinules,

and low inner ventral keel; hind femur with six inarticulate outer ventral spines (these spines as on middle femur but longer, and most distal spine strongly widened; Fig. 28), 1–2 inner ventral spines similar to outer ones but not large and situated only in distal part of femur, and two pairs of apical spinules (upper spinules distinctly longer and slightly protruding behind femoral apex; Fig. 29); fore tibia with a pair of small articulate dorsal spinules near distal edges of tympana (Fig. 18), six pairs of short and thin ventral spines (including a pair of apical spurs), one outer dorsoapical spur, very high outer dorsal keel, and very low inner one having three very low and rounded



Figs 18–27. *Paraphidnia*, male: 18, 19 – *P. mexicana* sp. nov.; 20, 21 – *P. peruana* sp. nov.; 22, 23 – *P. svetlanae* sp. nov.; 24, 25 – *P. bezverkhovi* sp. nov.; 26, 27 – *P. polestshuki* sp. nov. Dorsal surface of fore tibia near distal part of tympana (18, 20, 22, 24, 26); dorsal surface of middle tibia (19, 21, 23, 25, 27).

(weakly distinct) tubercles; middle tibia with three outer and 4–5 inner dorsal inarticulate spines similar to ventral spines of hind femur (inner spines distinctly narrower than outer ones), one thin and inarticulate inner dorsal subapical spine, one in-

ner dorsoapical spur, seven pairs of thin and articulate ventral spines (including a pair of apical spurs), and rather narrow distal part of tibia (Fig. 19); hind tibia with numerous moderately widened and inarticulate dorsal spines, rather sparse thin and articulate

ventral spines, six apical spurs, and rather narrow distal part (Fig. 28). Tegmina with general part of *RS* slightly longer than its longest branch (Fig. 38); stridulatory apparatus and distal part of costal lobe of hind wings as in Figs 39, 48, 49; stridulatory vein of left tegmen with 27 teeth. Cerci with lower projection of inner lobe wide and having five very small apical hooks (Fig. 58); subgenital plate with almost angular posteromedian notch (Fig. 59).

Female unknown.

Length in mm. Body 15; body with wings 44; pronotum: median length 2.8, maximal length 3.6; tegmina 32; hind femora 13.

Comparison. The new species is most similar to *P. lankesteri*, however it differs from the latter in the posterior denticle of upper rostral crest almost straight (not with the apical part hooked) and inner lobe of male cerci with the lower projection clearly wider (for comparison see Figs 1, 3, 58, 60). From *P. verrucosa*, the new species is distinguished by the posterior denticle of upper rostral crest much longer (for comparison see Figs 1, 4, 76), scape with a distinct finger-like medial process, and pronotal disc with distinctly higher tubercles.

Etymology. The species name is a Latin variant of the word Mexican (from Mexico).

***Paraphidnia (Anaphidna) peruana* Gorochov, sp. nov.**

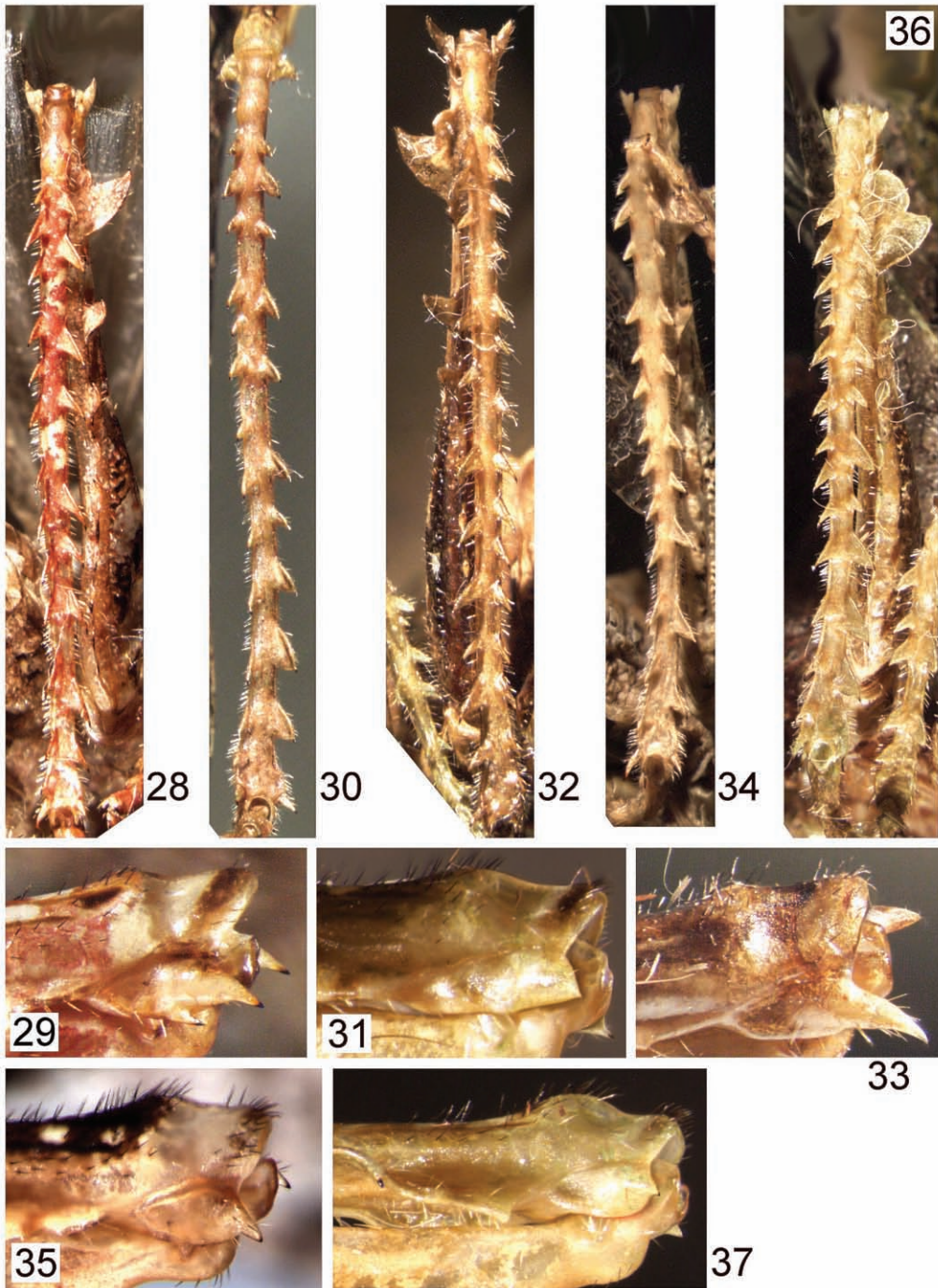
(Figs 5, 6, 14, 20, 21, 30, 31, 40, 41, 50, 51, 61, 62)

Holotype. Male; **Peru**, Junin Department, Satipo Prov., ~35 km NE of Satipo Town, environs of Mariposa Vill., ~1200 m, disturbed primary forest, at light, 17–18 Oct. 2008, coll. A. Gorochov, M. Berezin, L. Anisyutkin, E. Tkatsheva, V. Izersky (ZIN).

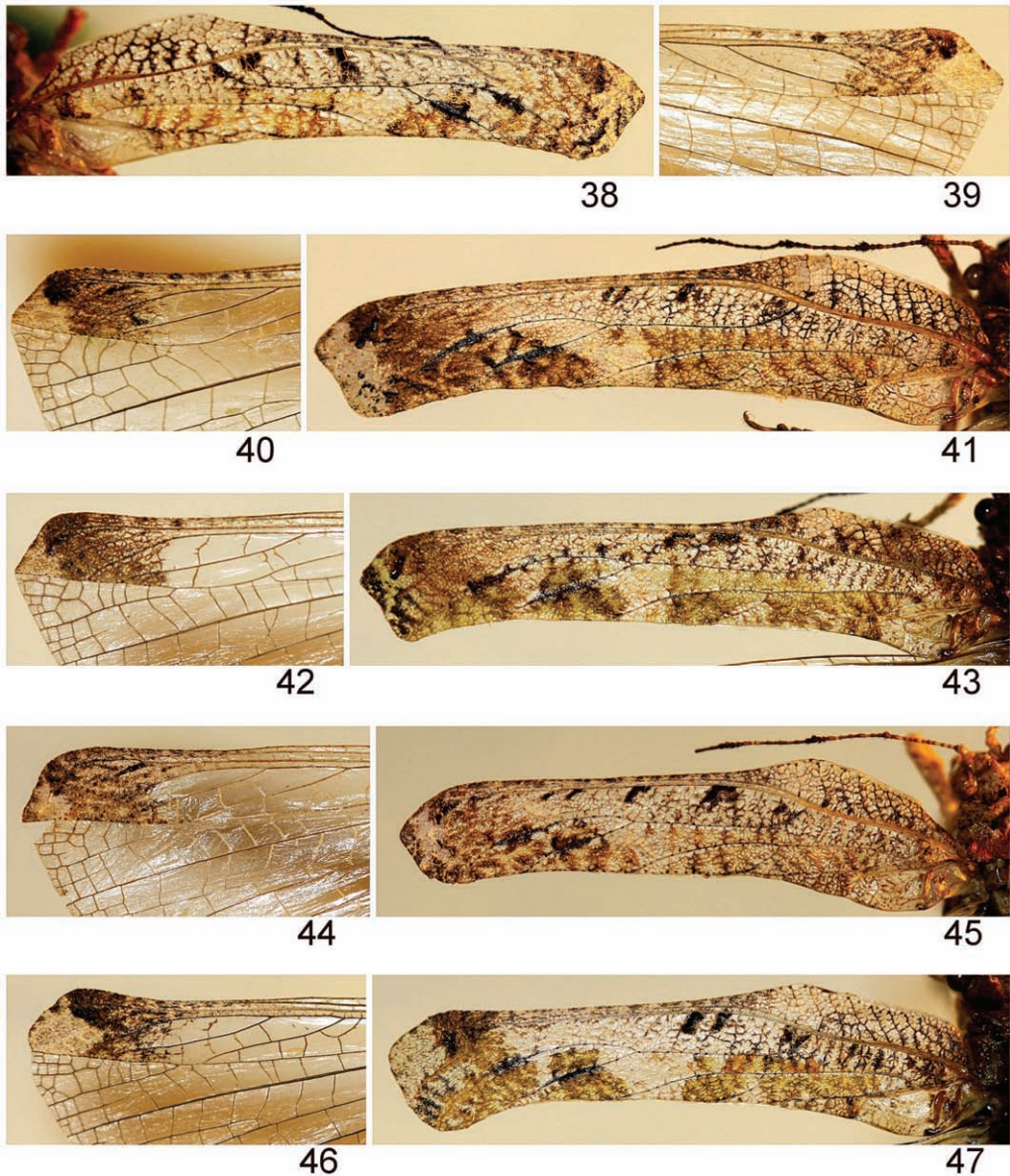
Paratypes. Two males, same data as for holotype; 1 male, same province, ~40 km NE of Satipo Town, environs of Calabaza Vill., 11°26.7'S, 74°46.4'W, 1492 m, at light, 22 Dec. 2010, coll. V. Sinyaev, S. Sinyaeva, V. Izersky (ZIN).

Description. *Male* (holotype). Colouration similar to that of *P. mexicana* but with following differences: head almost without

reddish tinge, without dark spots on face, and practically without yellowish spots on antennae (distal antennal part missing), but reddish marble pattern on palpi present; pronotum without reddish tinge and with only hind tubercles darkened; legs with less distinct light brown spots (but reddish areas on inner side of fore femora and on tibiae and tarsi more or less present), with brown spot on middle femora near apex, and with dark brown band along dorsal surface of hind femora (this band interrupted by three very light spots); tegmina with distinct greenish tinge, with reddish brown veinlets only in basal part, and with less transparent distal half (this half having oblique band near middle of tegmen almost whitish, more distal part marble greenish grey, and apical part almost completely whitish; Fig. 41); hind wings with a few small dark spots near apical part of costal lobe (Fig. 40); abdomen less spotted: with somewhat darkened dorsal areas near base, with small dark spots on lateral parts of posterior abdominal half and on median part of 10th tergite as well as at base of epiproct, and with darkened apices of cercal lobes. Structure of head similar to that of *P. mexicana*, however middle denticle of upper rostral crest more angular (angularly rounded), and posterior denticle of this crest much lower and with 2 small apical projections in profile (anterior one thinner and directed almost upwards; Fig. 5). Pronotal disc with anterior tubercles almost as in *P. mexicana*, middle tubercles distinctly lower than anterior ones (and than middle tubercles of *P. mexicana*), and posterior tubercles clearly larger (higher) than all previous tubercles (and than posterior tubercles of *P. mexicana*); outer surface of lateral pronotal lobes clearly granulated along ventral edge (Fig. 14). Legs also similar to those of *P. mexicana* in structure, but with 3–4 inner ventral spines of fore femur, 5–6 outer ventral spines of hind femur (1–3 proximal spines much smaller than others), 2–3 inner ventral spines of hind femur, 1–2 very small (low) lobes between latter spines, 1–2 pairs of apical spinules of hind



Figs 28–37. *Paraphidnia*, male: **28, 29** – *P. mexicana* sp. nov.; **30, 31** – *P. peruana* sp. nov.; **32, 33** – *P. svetlanae* sp. nov.; **34, 35** – *P. bezverkhovi* sp. nov.; **36, 37** – *P. polestshuki* sp. nov. Dorsal surface of hind tibia (28, 30, 32, 34, 36); apical part of hind femur (29, 31, 33, 35, 37).



Figs 38–47. *Paraphidnia*, male: **38, 39** – *P. mexicana* sp. nov.; **40, 41** – *P. peruana* sp. nov.; **42, 43** – *P. svetlanae* sp. nov.; **44, 45** – *P. bezverkhovi* sp. nov.; **46, 47** – *P. polestshuki* sp. nov. Right (38) and left (41, 43, 45, 47) tegmina; distal part of costal lobe of hind wing (39, 40, 42, 44, 46).

femur short (lower spinules very small, absent in one of legs; upper spinules short, not protruding behind femoral apex; Fig. 31), dorsal surface of fore tibia near distal edges of tympana having a pair of very small angular tubercles (outer tubercle almost indistinct; Fig. 20), four outer and 5–6 inner

ventral spines of fore tibia, 3–4 outer and 7–8 inner dorsal spines of middle tibia (only some of inner spines clearly smaller than outer ones; Fig. 21), and outer dorsal spines of hind tibia more widened than inner ones (Fig. 30). Tegmina with general part of *RS* distinctly shorter than its longest branch

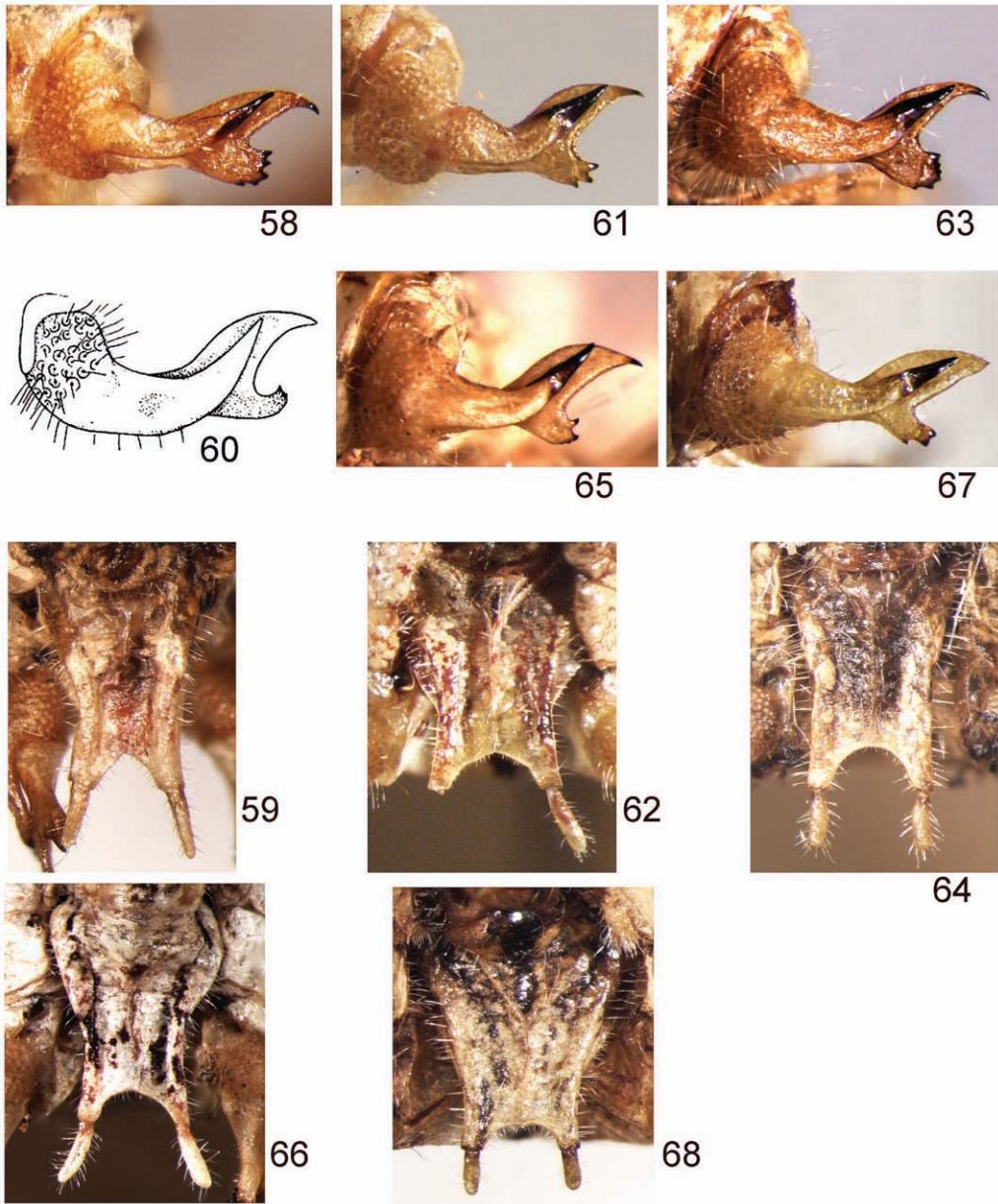


Figs 48–57. *Paraphidnia*, stridulatory apparatus of male tegmina: 48, 49 – *P. mexicana* sp. nov.; 50, 51 – *P. peruana* sp. nov.; 52, 53 – *P. svetlanae* sp. nov.; 54, 55 – *P. bezverkhovi* sp. nov.; 56, 57 – *P. polestshuki* sp. nov. Left tegmen (48, 50, 52, 54, 56); right tegmen (49, 51, 53, 55, 57).

(Fig. 41); stridulatory apparatus and distal part of costal lobe of hind wings as in Figs 40, 50, 51; stridulatory vein of left tegmen with 33 teeth. Cerci with lower projection of inner lobe moderately narrow and having three very small apical hooks (Fig. 61); subgenital plate distinguished from that of

P. mexicana only by posteromedian notch somewhat more rounded (Fig. 62).

Variations. Reddish areas on legs sometimes indistinct. Shape of denticles of upper rostral crest slightly varied. Middle tubercles of pronotal disc in male from Calabaza and in one paratype from Mariposa almost



Figs 58–68. *Paraphidnia*, male: **58, 59** – *P. mexicana* sp. nov.; **60** – *P. lankesteri*, holotype; **61, 62** – *P. peruana* sp. nov.; **63, 64** – *P. svetlanae* sp. nov.; **65, 66** – *P. bezverkhovi* sp. nov.; **67, 68** – *P. polestshuki* sp. nov. Cercus from side (58, 60, 61, 63, 65, 67); subgenital plate from below (59, 62, 64, 66, 68). [60, after Rehn (1918)].

indistinct. Armament of legs also somewhat varied: for example, both fore tibiae in male from Calabaza with very small outer articulate spinule (instead of inarticulate

tubercle) on dorsal surface near distal part of tympana; in one paratype from Mariposa, these tibiae with articulate spine in distal half on outer dorsal keel. Number of teeth

on stridulatory vein of left tegmen varied from 29 to 34. Other paratype from Mariposa having lower projection of inner cercal lobe almost as wide as in *P. mexicana* and with four very small apical hooks.

Female unknown.

Length in mm. Body 16–19; body with wings 48–51; pronotum: median length 2.6–3, maximal length 4.4–5; tegmina 35–37; hind femora 13–14.5.

Comparison. The new species differs from *P. mexicana* and *P. lankesteri* in the colouration with a greenish tinge, middle denticle of upper rostral crest more angular in profile, posterior denticle of this crest distinctly shorter (lower) and with two apices, hind femora with the upper apical spinules clearly shorter, and some dorsal spines of hind tibiae distinctly more widened (for comparison see Figs 28–31). From *P. verrucosa*, the new species is distinguished by the scape with a distinct finger-like distomedial process, and pronotal disc with distinctly higher anterior and posterior tubercles.

Etymology. The species name is derived from Peru.

Paraphidnia (Anaphidna) svetlanae

Gorochov, *sp. nov.*

(Figs 7, 8, 15, 22, 23, 32, 33, 42, 43, 52, 53, 63, 64)

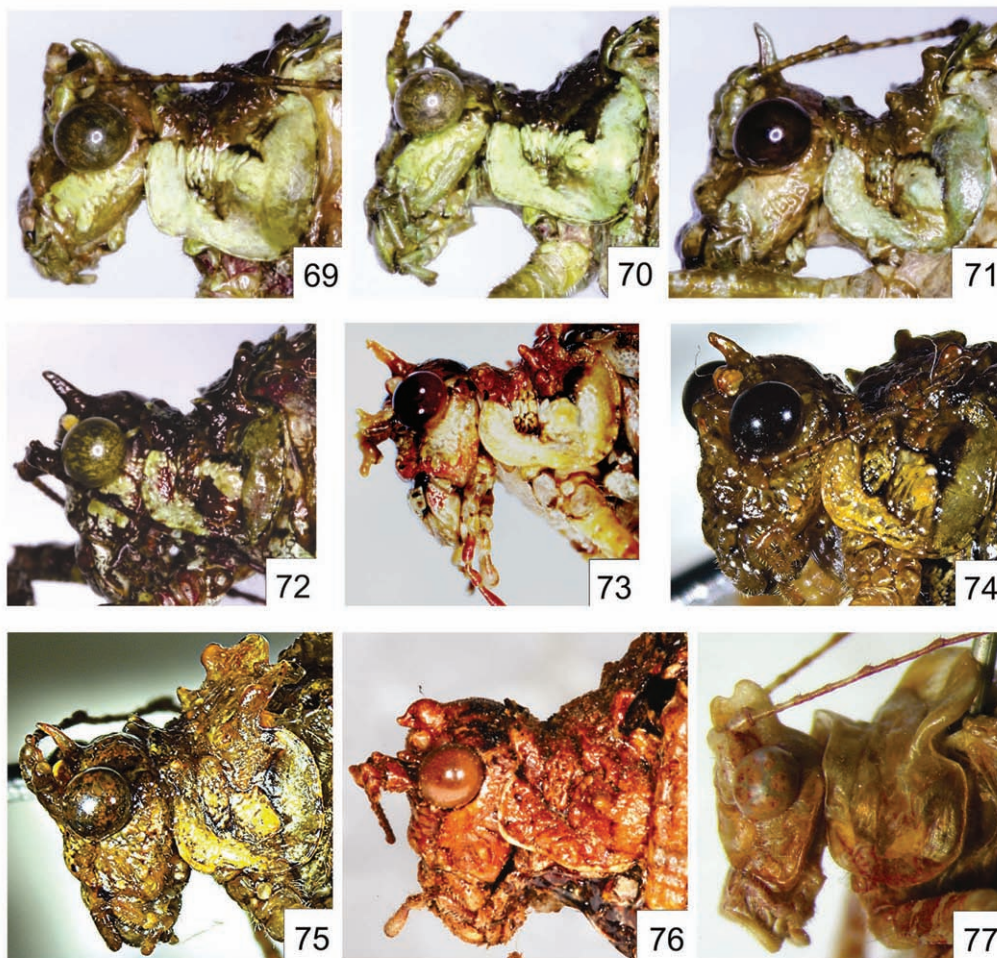
Holotype. Male; **Peru**, Cusco Department, 10 km N of Marcapata, 13°25'S, 70°54.3'W, 1265 m, at light, 7–8 Dec. 2010, coll. V. Sinyayev, S. Sinyayeva, Yu. Bezverkhov (ZIN).

Paratypes. Three males, same data as for holotype (ZIN).

Description. Male (holotype). Colouration and structure of body very similar to those of *P. peruana*, but distinguished by the following characters: face with a few more distinct dark marks under antennal cavities; reddish spots on legs absent; middle femora with small dark outer spot near base and brown mark near apex; proximal half of hind femora with brown upper half of outer surface and dark brown dorsal surface (these darkened parts interrupted by three very light oblique bands); whitish api-

cal area of tegmina with distinct dark brown marks along distal edge (Fig. 43); abdomen with less distinct darkened areas at base and on lateral surfaces, and with dark median spots on three posterior tergites and at base of epiproct; median ocellus weakly transverse; posterior denticle of upper rostral crest distinctly higher (its shape as in Fig. 7); pronotal disc with middle tubercles clearly higher than anterior ones, but somewhat smaller than posterior tubercles of this disc (Fig. 15); fore femora with three inner ventral spines; dorsal surface of fore tibiae near distal edge of tympana with very large inner inarticulate lobule and very small outer tubercle (Fig. 22); dorsal outer keel of fore tibia with one thin articulate spine in left leg and without it in right leg; inner dorsal spines of middle tibiae (Fig. 23) slightly less numerous (5–6); hind femora with two inner and 6–7 outer ventral spines, and with upper apical spinules much longer (and somewhat longer than in *P. mexicana*) (Fig. 33); outer dorsal spines of hind tibiae not wider than inner ones (Fig. 32); tegmina with general part of *RS* slightly shorter than its longest branch (Fig. 43); stridulatory apparatus with basal part (before stridulatory vein) somewhat longer as well as with region of stridulatory areas (after stridulatory vein) and chord somewhat shorter (Figs. 52, 53); stridulatory vein of left tegmen with 30 teeth; distal part of costal lobe of hind wings as in Fig. 42; cerci with lower projection of inner lobe wider and having 5–6 very small apical hooks (Fig. 63); subgenital plate with styles slightly shorter (Fig. 64).

Variations. Shape of posterior denticle of upper rostral crest slightly varied. Posterior tubercles of pronotal disc sometimes almost equal to middle ones in size. Armament of legs also somewhat varied: for example, one paratype with additional inarticulate and slightly widened spine on dorsal inner edge of fore tibia (but large inner dorsal lobule near distal edge of tympanum well developed in all specimens). Number of teeth on stridulatory vein of left tegmen in paratypes varied from 27 to 29.



Figs 69–77. *Paraphidnia*, head and pronotum of male from side: 69 – *P. osae* sp. nov.; 70 – *P. hernandezi* sp. nov.; 71 – *P. rhinoceros* sp. nov.; 72 – *P. rubricorpus* sp. nov.; 73 – *P. graciellae* sp. nov.; 74 – *P. silvai* sp. nov.; 75 – *P. quirozi* sp. nov.; 76 – *P. verrucosa*, holotype (© H. Braun); 77 – *P. galilina*, syntype (© F. Buzzeti).

Female unknown.

Length in mm. Body 15–17; body with wings 47–49; pronotum: median length 2.4–2.8, maximal length 3.5–4; tegmina 32–34; hind femora 13–14.

Comparison. The new species differs from *P. peruana* in the posterior denticle of upper rostral crest clearly higher, middle tubercles of pronotal disc higher (longer) than its anterior tubercles, fore tibiae with a rather large inner lobule on their dorsal surface near distal edge of tympanum, hind

femora with upper apical spinules distinctly longer, chord of male stridulatory apparatus shorter, and lower projection of inner lobe of male cerci somewhat wider. From *P. mexicana*, *P. lankesteri* and *P. verrucosa*, the new species differs in the same characters as *P. peruana* (except the length of apical spinules of hind femora).

Etymology. The species is named in honour of one of its collectors, Svetlana Sinyeva.

Paraphidnia (Anaphidna) bezverkhoviGorochov, **sp. nov.**

(Figs 9, 10, 16, 24, 25, 34, 35, 44, 45, 54, 55, 65, 66)

Holotype. Male; **Peru**, Junin Department, Satipo Prov., ~25 km SE of Satipo Town, environs of Rio Venado Vill., ~1200 m, partly primary / partly secondary forest, at light, 20–23 Oct. 2008, coll. A. Gorochov, M. Berezin, L. Anisyutkin, E. Tkatsheva, V. Izersky (ZIN).

Paratypes. **Peru:** 3 males, Cusco Department, 7 km NE of Mandor, 13°18.7'S, 70°49.5'W, 890 m, at light, 1–3 Dec. 2010, coll. V. Sinyaev, S. Sinyaeva, Yu. Bezverkhov (ZIN); 5 males, Ucayali Department, 11 km from Puerto Bermudes, 10°29.9'S, 75°03.1'W, 713 m, at light, 10–12 March 2011, coll. V. Sinyaev, A. Polestshuk (ZIN).

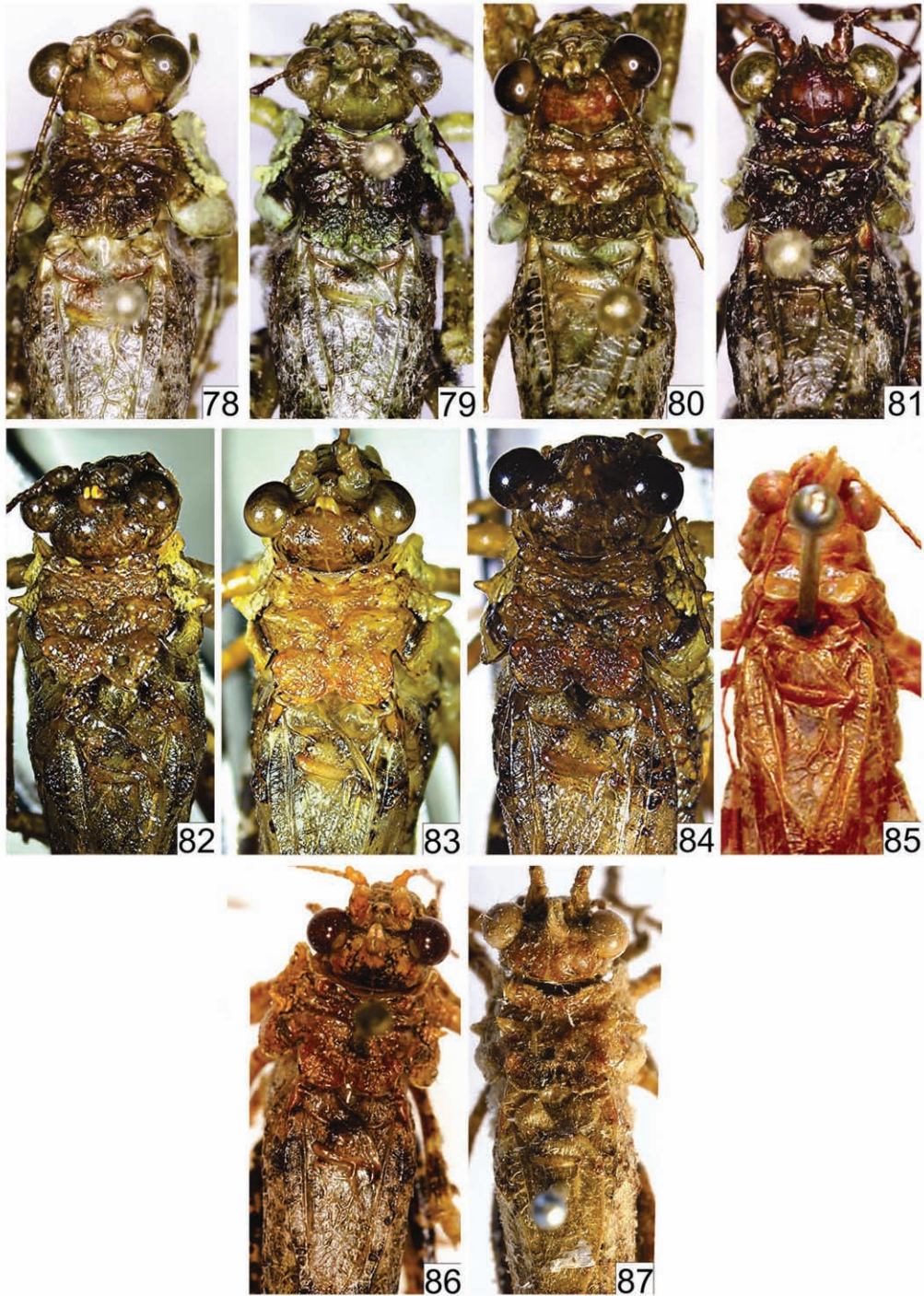
Description. Male (holotype). Colouration and structure of body very similar to those of *P. peruana*, but distinguished by the following features: face with several small brown spots (under eyes, under lateral parts of antennal cavities, under median ocellus, between these spots and clypeal suture, near lateral corners of clypeus, and on clypeus); hind part of vertex with brown areas and dots near them; pronotum with small brown marks along edges (except for anterior half of ventral edge of lateral lobes) and near middle of lateral lobes (Fig. 16); middle femora with rather numerous small and very small brown spots on different parts of their outer surface; brown areas on outer surface of proximal half of hind femora additionally interrupted or almost interrupted by very light narrow stripes; tegmina slightly more transparent (almost as in *P. mexicana*) and with whitish apical area having dark marks similar to those of *P. svetlanae* (Fig. 45); abdomen with darkened areas at base and on lateral surfaces almost as in *P. svetlanae*; median ocellus weakly transverse; middle denticle of upper rostral crest almost as in *P. mexicana*; posterior denticle of this crest almost hook-like in profile (Fig. 9); pronotal disc with anterior and middle tubercles practically absent (only low convexities developed instead of them), as well as with posterior tubercles

lower and transverse fold less deep than in all species described here (*P. mexicana*, *P. peruana*, *P. svetlanae*) (Fig. 16); dorsal surface of fore tibia near distal edge of tympana with very small inner tubercle and small articulate outer spine in right leg (Fig. 24), and only with small articulate inner spine in left leg; dorsal outer keel of right fore tibia with additional spine of similar structure; middle tibia with three outer and four inner dorsal spines, and with slightly narrower distal part (Fig. 25); inner ventral keel of hind femur with one spine not far from apex; apex of hind femur without lower spinules and with upper spinules more or less intermediate between those of *P. mexicana* and *P. peruana* (Fig. 35); outer dorsal spines of hind tibia not wider than inner ones (approximately as in *P. mexicana* and *P. svetlanae*) (Fig. 34); tegmina almost as in *P. svetlanae* but with apical part insignificantly narrower (Fig. 45) and stridulatory apparatus more similar to that of *P. mexicana* (however, region of chord narrower than in latter species; Figs 54, 55); cerci with lower projection of inner lobe having four very small apical hooks (Fig. 65).

Variations. Shape of posterior denticle of upper rostral crest slightly varied, but this denticle in one paratype from Puerto Bermudes almost not hook-like and with two apices. Armament of legs also somewhat varied: dorsal surface of fore tibia near distal edge of tympana sometimes without any spines and tubercles, with only very small inner tubercle, or with a pair of small articulate spines in one of the legs; outer dorsal keel of both fore tibiae without spines in all paratypes. Number of teeth on stridulatory vein of left tegmen varied from 28 to 30. Lower projection of inner cercal lobe sometimes with two or three very small apical hooks; posteromedian notch of subgenital plate varied from practically rounded (Fig. 66) to almost rectangular (with anterior edge almost transversally straight).

Female unknown.

Length in mm. Body 13–15; body with wings 38–41; pronotum: median length



Figs 78–87. *Paraphidnia*, anterior part of male body from above: 78 – *P. osae* sp. nov.; 79 – *P. hernandezii* sp. nov.; 80 – *P. rhinoceros* sp. nov.; 81 – *P. rubricarpus* sp. nov.; 82 – *P. quirozi* sp. nov.; 83 – *P. graciela* sp. nov.; 84 – *P. silvai* sp. nov.; 85 – *P. gallina*, syntype (© F. Buzzeti); 86 – *P. ?verrucosa* (© H. Braun); 87 – *P. lankesteri* (© A. Agudelo).

2.5–2.9, maximal length 3–3.3; tegmina 27–29; hind femora 11.5–12.5.

Comparison. The new species differs from *P. peruana* in the smaller size of body, anterior and middle tubercles of pronotal disc almost undeveloped, posterior tubercles of this disc clearly lower, and the absence of strongly widened spines on outer dorsal keel of hind tibia; from *P. svetlanae*, *P. mexicana* and *P. lankesteri*, in the posterior denticle of upper rostral crest lower, pronotal disc with the tubercles distinctly lower and transverse fold clearly less deep, and upper apical spinules of hind femora clearly shorter; and from *P. verrucosa*, in the scape provided with distinct medial process, pronotal disc with the transverse fold less deep, and tegmina with the apical part more or less narrowed.

Etymology. The species is named in honour of one of its collectors, Yuri Bezverkhov.

Paraphidnia (Anaphidna) polestshuki

Gorochov, **sp. nov.**

(Figs 11, 12, 17, 26, 27, 36, 37, 46, 47, 56, 57, 67, 68)

Holotype. Male; **Peru**, Ucayali Department, 11 km from Puerto Bermudes, 10°29.9'S, 75°03.1'W, 713 m, at light, 10–12 March 2011, coll. V. Sinyayev, A. Polestshuk (ZIN).

Paratype. Male, same data as for holotype (ZIN).

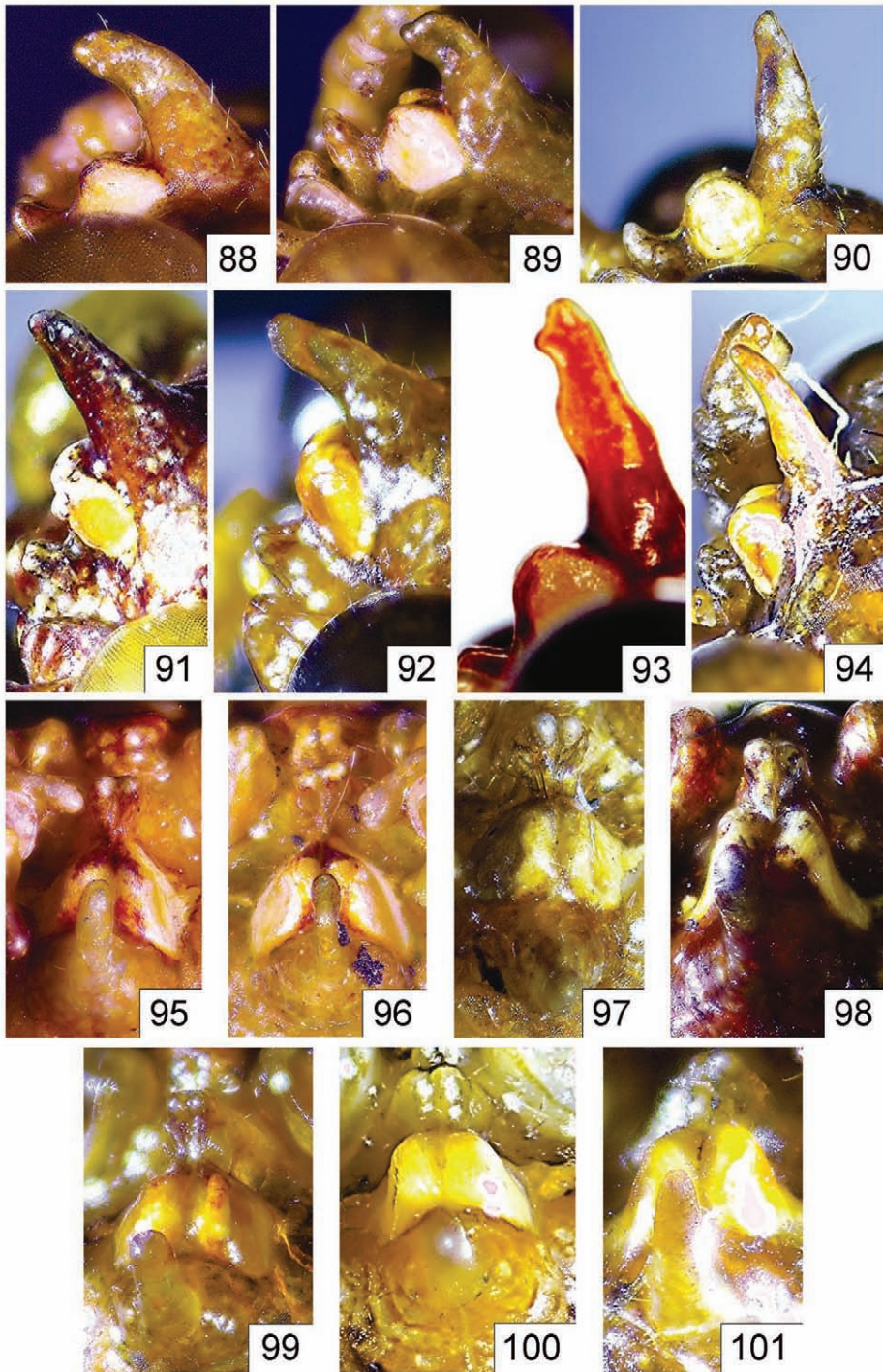
Description. Male (holotype). Colouration and structure of body very similar to those of *P. bezverkhovi*, however with following differences: head light brown with yellowish genae as well as with distinct brown spots only under lateral parts of antennal cavities and on hind part of vertex; pronotum with disc and upper part of lateral lobes light brown (but somewhat darker than most part of head), posterior part of lateral lobes greenish, and rest of these lobes yellowish (Fig. 17); fore and middle legs yellowish with greenish tinge, without reddish marks, and without brown spots on middle femora; hind legs with weak traces of reddish spots on tibiae and without reddish tinge on tarsi; tegmina almost

without reddish veinlets, with somewhat wider whitish band in middle part, and with whitish apical area clearly longer (Fig. 47); hind wings with whitish apical area also distinctly longer (Fig. 46); dorsum of three last abdominal tergites with 3–4 dark spots on each tergite; apex of anterior denticle of upper rostral crest distinctly wider and almost bifurcate (Fig. 12); shape of middle and posterior denticles of this crest approximately intermediate between those of *P. bezverkhovi* and *P. peruana*, but latter denticle slightly lower (Fig. 11); pronotal disc with anterior tubercles slightly larger, and transverse fold somewhat deeper (Fig. 17); pronotal lateral lobes almost not granulated along ventral edge (Fig. 17); fore femur with 2–3 inner ventral spines; dorsal surface of fore tibia near distal edges of tympana with rather large inner tubercle and without distinct outer tubercle (Fig. 26); distal parts of middle and hind tibiae somewhat widened (wider than in all previous species described here) (Figs 27, 36); apical spinules of hind femur practically as in *P. peruana* (Fig. 37); distal part of tegmina and subapical part of hind wings somewhat wider (and also wider than in *P. mexicana*, *P. peruana* and *P. svetlanae*) (Figs 46, 47); stridulatory apparatus intermediate between those of *P. mexicana* and *P. peruana* but with chord almost as in *P. mexicana* (Figs 56, 57) and stridulatory vein of left tegmen having 34 teeth; cerci with apex of upper projection of inner lobe less spine-like than in all previous species described here (Fig. 67); subgenital plate with anterior edge of posteromedian notch almost transversely straight, and styles approximately as in *P. svetlanae* (Fig. 68).

Female unknown.

Length in mm. Body 15.5–18; body with wings 39–42; pronotum: median length 2.7–3, maximal length 3.4–3.8; tegmina 28–30; hind femora 11.5–12.

Comparison. The new species is similar to *P. bezverkhovi* by the low tubercles of pronotal disc, but distinguished by the apex of anterior denticle of upper rostral crest wider and almost bifurcate, posterior denticle



Figs 88–101. *Paraphidnia*, male: 88, 95 – *P. osae* sp. nov.; 89, 96 – *P. hernandezi* sp. nov.; 90, 97 – *P. rhinoceros* sp. nov.; 91, 98 – *P. rubricorpus* sp. nov.; 92, 99 – *P. silvai* sp. nov.; 93, 100 – *P. gracielae* sp. nov.; 94, 101 – *P. quirozi* sp. nov. Upper rostral tubercle from side (88–94) and from above (95–101).

of this crest somewhat lower, pronotum less granulated along ventral edge of its lateral lobes, distal part of middle and hind tibiae widened, tegminal distal part and subapical part of costal lobe of hind wings wider and with the whitish area longer. From *P. verrucosa* (Fig. 4, 76), similar to *P. polestshuki* by the shape of upper rostral crest and structure of pronotum, the new species differs in the scape having a distinct medial process, transverse fold of pronotal disc less deep, lateral lobes of pronotum distinctly lighter and almost not granulated along their ventral edge; and from all the other congeners, in the characteristic shape of upper rostral crest (for comparison see Figs 1, 3, 5, 7, 11), tubercles of pronotal disc distinctly lower, dorsal surface of fore tibia near distal edge of inner tympanum with a large (but not very large) tubercle, distal part of middle and hind tibiae as well as tegminal distal part and subapical part of costal lobe of hind wings widened, and whitish apical area on tegmina and hind wings longer.

Etymology. The species is named in honour of one of its collectors, Alexander Polestshuk.

Paraphidnia (Anaphidna) graciellae

Cadena-Castañeda, **sp. nov.**

(Figs 73, 83, 93, 100, 107, 127, 134)

Holotype. Male; **Colombia**, Boyacá Department, Coper, Turtur, 5°26'19.54"N, 74°0'16.29"W, 1175 m, 21 Sept. 2009, coll. O. Cadena-Castañeda (MUD).

Description. Male (holotype). General colouration light green, but epicranium light red with genae light green, pronotal disc red with lateral lobes yellowish, hind femora predominantly brown with some green stripes, tegmina green with anal region dark green and costal region having brown veinlets as well as with tegminal apex brown but having whitish marks. Posterior denticle of upper rostral crest long, thin and almost straight, with antero-ventral margin having two convexities in profile (apical part of this denticle almost

bifurcate in profile; Fig. 73, 93); middle denticle of upper rostral crest 0.35 times as long as posterior one and rather wide (Figs 93, 100); median ocellus circular. Pronotum with four very distinct tubercles (73, 83). Hind femur with seven spines on ventro-external margin; ventro-internal margin of this femur with two distal spines of similar shape; hind tibiae with ten triangular spines on dorso-external margin and twelve spines on dorso-internal margin; inner genicular lobes of fore and middle femora unarmed, but all other femoral genicular lobes with spine. Stridulatory vein of left tegmen with 30 teeth (Fig. 107). Cerci: outer lobe weakly curved (almost not hook-like) but with apex more or less acute and strongly sclerotised; inner lobe with upper projection normal for other representatives of *Anaphidna* and with lower projection much shorter than upper projection; this lower projection rather high, rounded in profile, and with seven small marginal denticles (Fig. 127). Subgenital plate with U-shaped posteromedian notch; its styles finger-like and as long as the depth of this notch (Fig. 134).

Female unknown.

Length in mm. Body with wings 40; pronotum 4; tegmina 32; hind femora 12; subgenital plate 1.8.

Comparison. The new species is most similar to *P. mexicana* and *P. lankesteri* by the shape of rostral tubercles and general appearance, but differs in the posterior denticle of upper rostral crest almost bifurcate in profile (not finger-like as in *P. mexicana* and not curved as in *P. lankesteri*).

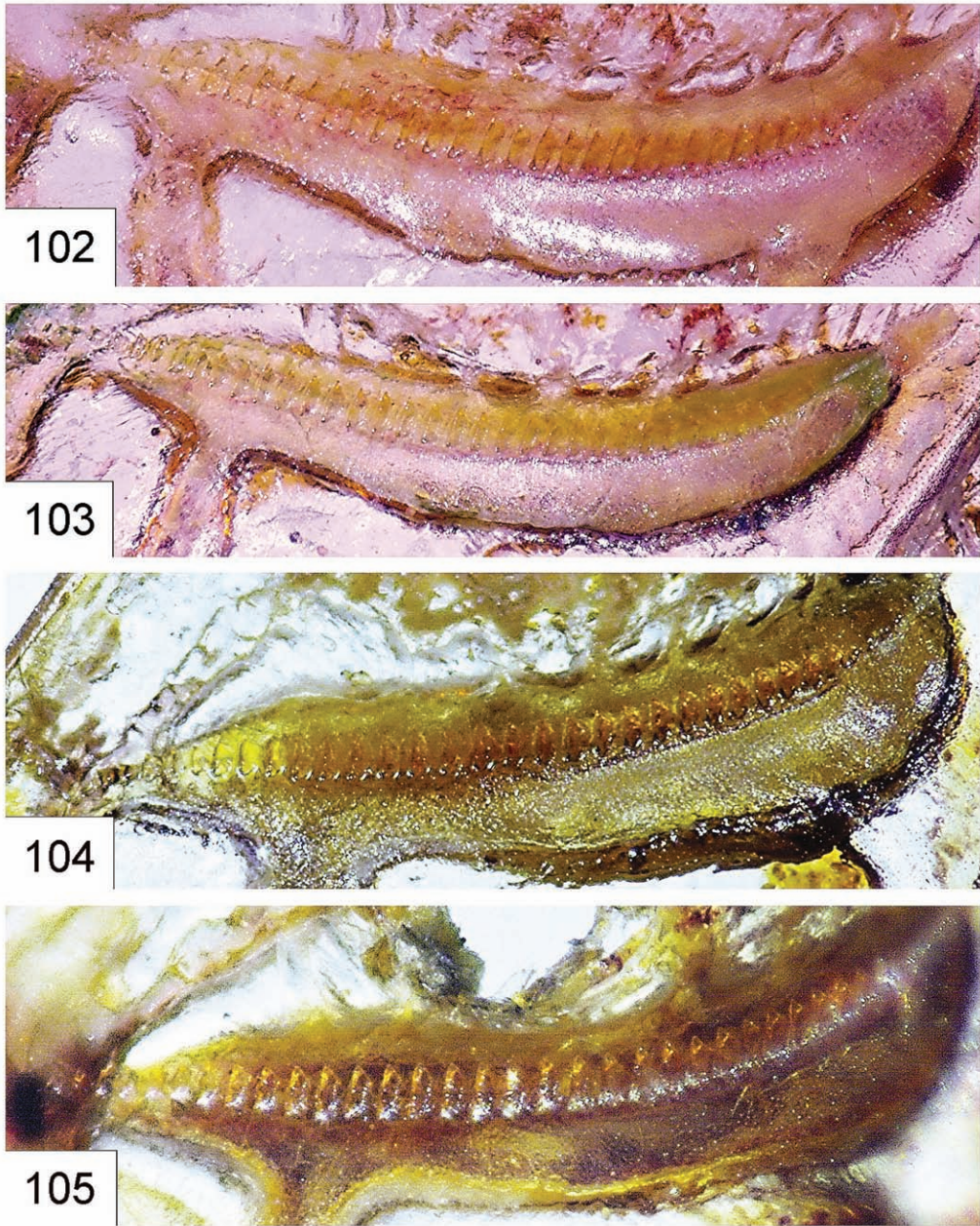
Etymology. The species is named in memory of Graciela Osorio de Cadena, grandmother of the first co-author (1944–2009).

Paraphidnia (Anaphidna) quirozi

Cadena-Castañeda, **sp. nov.**

(Figs 75, 82, 94, 101, 108, 128, 135)

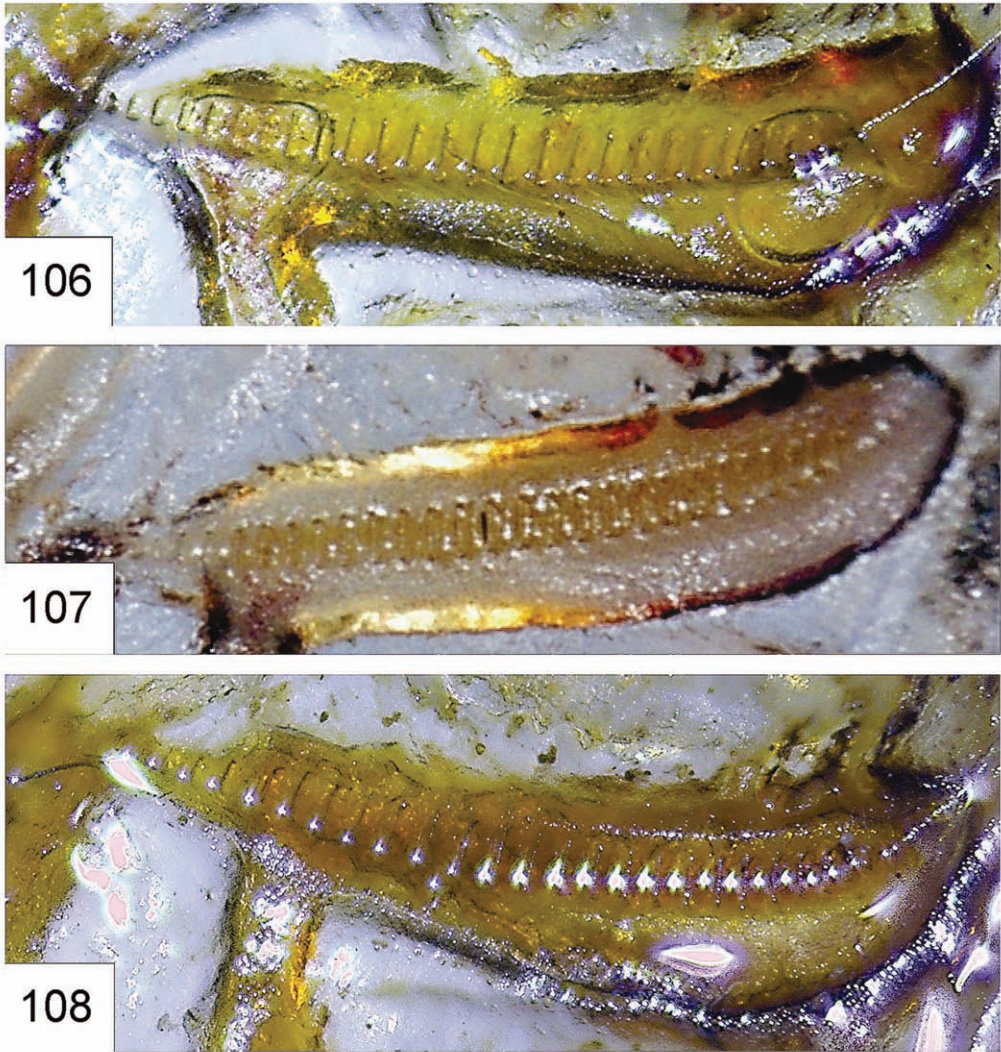
Holotype. Male; **Colombia**, Antioquia Department, Ituango, 7°10'9.99"N, 75°44'58.36"W, 1551 m, 21 Nov. 2009, coll. O. Cadena-Castañeda (MUD).



Figs 102–105. *Paraphidnia*, stridulatory vein of left male tegmen from below: 102 – *P. osae* sp. nov.; 103 – *P. hernandezii* sp. nov.; 104 – *P. rhinoceros* sp. nov.; 105 – *P. rubricorpus* sp. nov.

Description. Male (holotype). General colouration light red, but epicranium with green genae, pronotum with red disc and yellowish lateral lobes, hind femora predominantly red with some brown stripes,

tegmina green with dark green anal region and brown veinlets in costal region as well as with whitish marks in apical region. Posterior denticle of upper rostral crest similar to that of *P. graciellae* but somewhat shorter,



Figs 106–108. *Paraphidnia*, stridulatory vein of left male tegmen from below: **106** – *P. silvai* sp. nov.; **107** – *P. graciellae* sp. nov.; **108** – *P. quirozi* sp. nov.

slightly curved forwards, almost without convexities on anteroventral margin, and with narrowly rounded apex (Figs 75, 94); middle denticle of this rostral crest also similar to that of *P. graciellae* but somewhat higher (Figs 94, 101); median ocellus wedge-shaped. Pronotum with tubercles almost as in *P. graciellae* (Figs 75, 82). Hind femur with four triangular spines on ventro-external margin; ventro-internal margin of this femur with one small spinule in

middle part; hind tibia with ten spines on dorso-external margin and fourteen spines on dorso-internal margin; femoral genicular lobes as in *P. graciellae*. Stridulatory vein of left tegmen with 26 teeth (Fig. 108). Cerci similar to those of *P. graciellae* but with outer lobe more strongly curved (hook-like) and with lower projection of inner lobe distinctly lower (narrower) and having two small marginal denticles (Fig. 128); subgenital plate also similar to that of *P. graciellae*



Figs 109–117. *Paraphidnia hernandezii* sp. nov., head and pronotum of different males from side.

but with posteromedian notch clearly wider and less deep (Fig. 135).

Female unknown.

Length in mm. Body with wings 37; pronotum 4; tegmina 30; hind femora 12; subgenital plate 1.8.

Comparison. The new species is most similar to *P. graciellae*, but it differs from the latter species in the less numerous spines of hind femora and some other characters listed above. From *P. mexicana* and *P. lanksteri*, similar to both these congeners by the shape of rostral tubercles, the new species differs in the posterior denticle of upper rostral crest shorter and/or very weakly curved as well as less numerous spines on the hind femora.

Etymology. The species is named in honour of John Alveiro Quiroz, collection manager from the entomological collection

“Francisco Luis Gallego”, Medellin, Colombia.

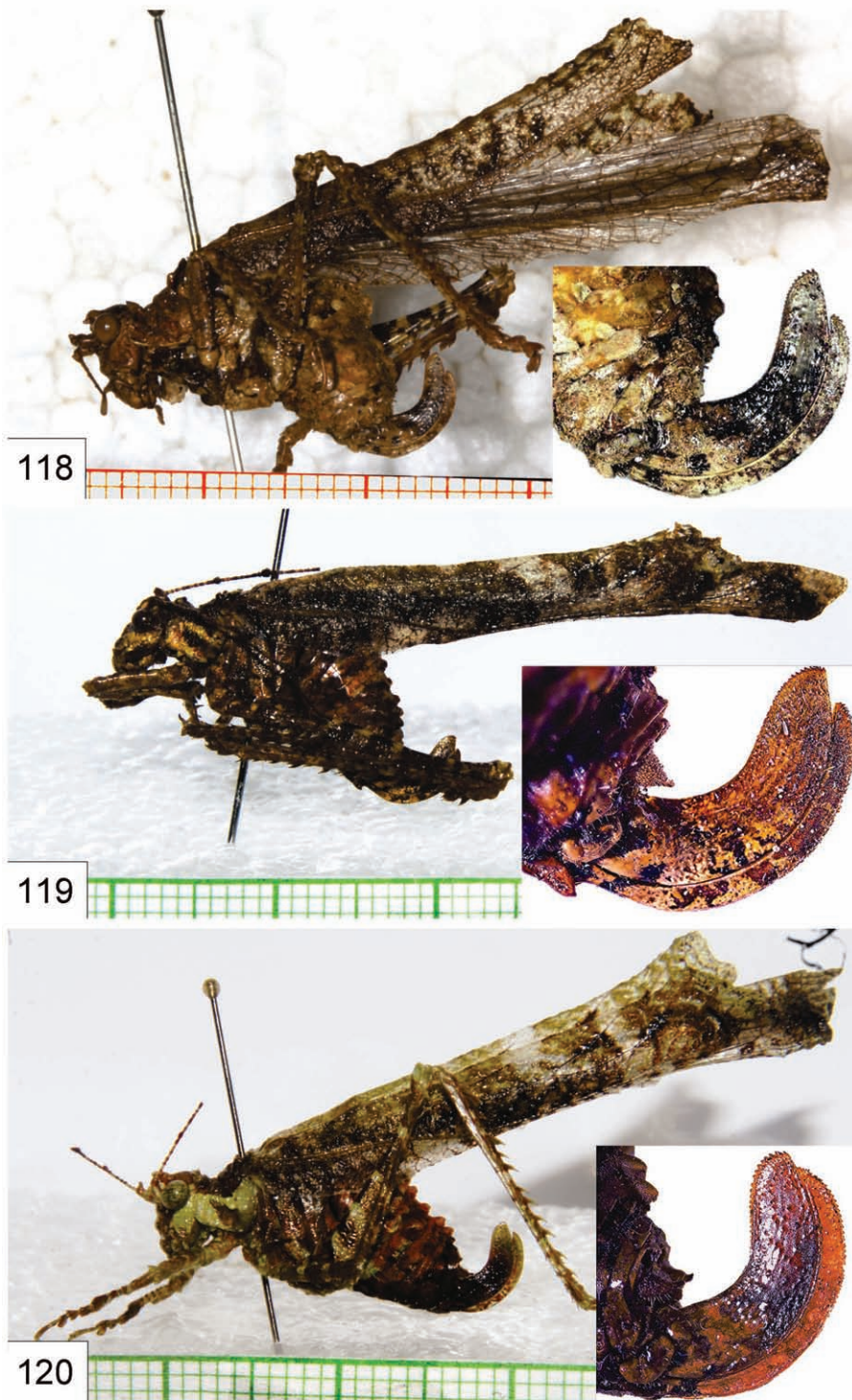
Paraphidnia (Anaphidna) silvai

Cadena-Castañeda, sp. nov.

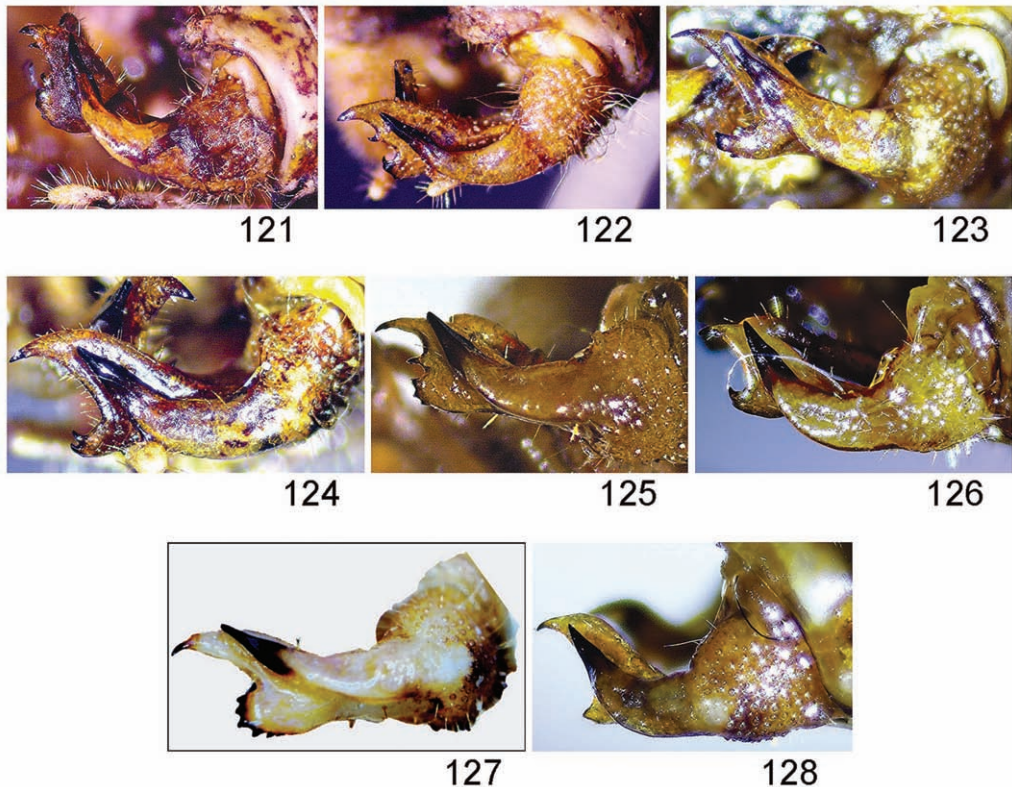
(Figs 74, 84, 92, 99, 106, 125, 126, 133)

Holotype. Male; **Colombia**, Antioquia Department, San Francisco. 5°57'59.85''N, 75°6'22.50''W, 1128 m, 21 Nov. 2009, coll. O. Cadena-Castañeda (MUD).

Description. Male (holotype). General colouration light green, but epicranium light brown (including genae), pronotum dark brown with yellowish lateral lobes, hind femora predominantly brown with some green and white stripes, tegmina green with dark green anal region and brown veinlets in costal region as well as with brown apical part having green and



Figs 118–120. *Paraphidnia*, female and its ovipositor from side: **118** – *P. verrucosa*, holotype (© H. Braun); **119** – *P. osae* sp. nov.; **120** – *P. hernandezii* sp. nov.



Figs 121–128. *Paraphidnia*, cercus from side: 121 – *P. osae* sp. nov.; 122 – *P. hernandezi* sp. nov.; 123 – *P. rhinoceros* sp. nov.; 124 – *P. rubricorpus* sp. nov.; 125, 126 – *P. silvai* sp. nov. (125, right cercus; 126, left cercus, photo reversed); 127 – *P. graciellae* sp. nov.; 128 – *P. quirozi* sp. nov.

whitish marks. Denticles of upper rostral crest very similar to those of *P. quirozi* (Figs 74, 92, 99); median ocellus circular. Pronotum with tubercles similar to those of *P. graciellae* and *P. quirozi* (Figs 74, 84). Hind femur with four triangular spines on ventro-external margin; ventro-internal margin of this femur with two distal spines of similar shape; hind tibia with ten spines on dorso-external margin and twelve spines on dorso-internal margin; inner genicular lobe of fore femur unarmed, but all other genicular lobes of fore, middle and hind femora with spine. Stridulatory vein of left tegmen with 27 teeth (Fig. 106). Cerci intermediate between those of *P. graciellae* and *P. quirozi* in shape of outer lobe; one cercus with inner lobe similar to that of holotype of *P. graciellae*, and other cercus with this lobe similar

to that of holotype of *P. quirozi*, but both these lobes with five marginal denticles on lower projection (Fig. 125, 126). Subgenital plate as in *P. graciellae* but with slightly narrower distal part (Fig. 133).

Female unknown.

Length in mm. Body with wings 38; pronotum 3.7; tegmina 32; hind femora 12; subgenital plate 1.8.

Comparison. The new species is most similar to *P. quirozi*, but it has a spine on the inner genicular lobe of middle femur (this spine is absent in *P. quirozi* and *P. graciellae*), somewhat more numerous spines on the ventro-internal margin of the hind femur, and a less deep notch of the male subgenital plate. From all the other congeners, the new species differs in the same characters as *P. quirozi* (except for the shape of notch

of male subgenital plate, which is similar in the new species and in *P. graciellae*).

Etymology. The species is named in honour of Daniel Felipe Silva, an outstanding coleopterist from the Universidad Industrial de Santander, Bucaramanga, Colombia.

Paraphidnia (Anaphidna) osae Cadena-Castañeda, sp. nov.

(Figs 69, 78, 88, 95, 102, 119, 121, 129)

Holotype. Male (INBIO CRI 000327891); **Costa Rica**, Puntarenas Prov., Osa Peninsula, "Rancho Quemado", 200 m, May 1991 (INBio).

Paratypes. **Costa Rica:** 1 female (INBIO CRI 0001321045), same locality, Oct. 1990, coll. F. Quesada (INBio); 1 male (INBIO CRI 001328354), same province and peninsula, Esquinas Station, 0 m, Oct. 1992, coll. A. Gutierrez (MUD).

Description. Male (holotype). General colouration light green, but epicranium light brown with light green genae, pronotum dark brown with yellowish lateral lobes, hind femora predominantly brown with some whitish stripes, tegmina transparent with green anal region and brown veinlets in costal region as well as with apical part having brown and whitish marks. Posterior denticle of upper rostral crest thin, distinctly shorter than in *P. mexicana*, *P. lankesteri*, *P. graciellae* and slightly shorter than in *P. quirozi* and *P. silvae*, clearly curved forwards, and with narrowly rounded apex (Figs 69, 88); middle denticle of this rostral crest clearly or slightly lower than in five latter species, with dorsal edge hardly concave in profile (not roundly convex as in these species; Figs 88); median ocellus circular. Pronotal disc with a pair of metazonal tubercles very low and other tubercles inconspicuous (Fig. 69, 78). Fore femur with four spines on ventro-external margin; ventro-internal margin of this femur with one distal spine of similar shape; hind tibiae with twelve spines on both margins; all genicular lobes with spine. Stridulatory vein of left tegmen with 34 teeth (Fig. 102). Cerci: outer lobe hook-like, similar to that of *P. silvae*; inner lobe similar to that of *P. graciellae* but with

five marginal denticles (Fig. 121). Subgenital plate with posteromedian notch almost as in *P. quirozi* but with short and rounded median projection (Fig. 129).

Variations. Other male with posterior denticle of upper rostral crest slightly longer and almost similar to that of *P. lankesteri*.

Female. General appearance as in male, but colouration slightly darker and posterior denticle of upper rostral crest with small additional convexity on anteroventral margin (Fig. 119). Ovipositor similar to that of *P. verrucosa* but with distal half of upper valvae clearly higher (wider) (for comparison see Figs 118 and 119).

Length in mm. Body with wings: male 36, female 38; pronotum: male 4.4, female 4.8; tegmina: male 30, female 33; hind femora: male 15, female 15; ovipositor 6.

Comparison. The new species is somewhat similar to *P. quirozi*, *P. silvae*, *P. mexicana*, *P. graciellae* and *P. lankesteri* by the shape of rostral tubercles, but it differs from them in the posterior denticle of upper rostral crest slightly or distinctly shorter and more strongly curved (but *P. lankesteri* has this denticle similarly curved), middle denticle of this crest lower and with the dorsal edge hardly concave (but *P. mexicana* has this denticle almost similar in shape), tubercles of pronotal disc less distinct, and male subgenital plate with a short median projection. From all the other species of *Anaphidna*, the new species differs in the posterior denticle of upper rostral crest distinctly longer and/or not bifurcate in profile.

Etymology. The species name originates from Osa Peninsula.

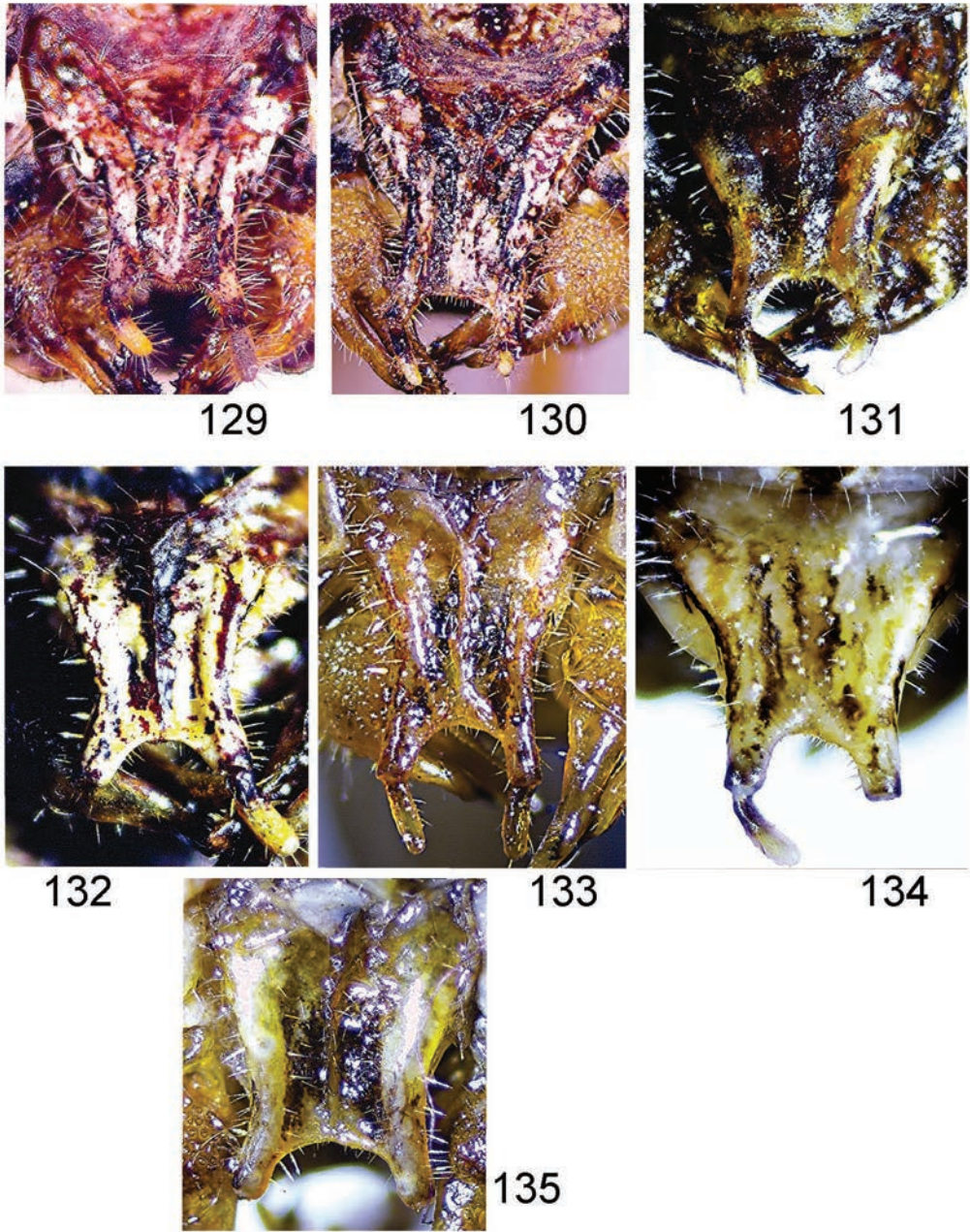
Paraphidnia (Anaphidna) hernandezi

Cadena-Castañeda, sp. nov.

(Figs 70, 79, 89, 96, 103, 109–117, 120, 122, 130)

Holotype. Male (INBIO CRI 002557456); **Costa Rica**, Puntarenas Prov., "Estación Río bonito", 100 m, 7–20 Apr. 1997, coll. E. Fletes (INBio).

Paratypes. **Costa Rica:** 1 male (INBIO CRI 002438319), **Puntarenas Prov.**, "Albergue Cerro



Figs 129–135. *Paraphidnia*, male subgenital plate from below: 129 – *P. osae* sp. nov.; 130 – *P. her-
nandezi* sp. nov.; 131 – *P. rhinoceros* sp. nov.; 132 – *P. rubricorpus* sp. nov.; 133 – *P. silvai* sp. nov.;
134 – *P. graciellae* sp. nov.; 135 – *P. quirozi* sp. nov.

de Oro", 150–170 m, 10–25 March 1991 (INBio); 1 male (INBio CRI 000327891), *Heredia Prov.*, "Sarapiquí, Finca Naranjo Valencia, Pueblo Nuevo", 90 m, 28 Feb. 1993 (INBio); 2 males (INBio CRI 000955387 and INBio CRI 000958665), same locality, but 9–30 Feb. 1992, coll. M. Ortiz (MUD); 1 male (INBio CRI 000327891), same province, "Sarapiquí, La Virgen", Tirimbima Biological Station, 100–200 m, 29 Sept. 2008, coll. L. Chacón (INBio); 1 male and 1 female (INBio CRI 000314543), same province, "P. N. Braulio Carrillo", Magsasay Station, 200 m, Feb. 1991, coll. A. Fernandez (INBio); 1 male (INBio CRI 001311368), same locality, May 1991, coll. M. Zumbado (INBio); 1 female (INBio CRI 000314543), same province, "P. N. Braulio Carrillo", El Ceibo Station, 400–600 m, May 1991, coll. C. Chavez (INBio); 1 male and 1 female (INBio CRI 001247994), same province, La Selva Biological Station, 50–150 m, Sept. 1995 (MUD); 2 males and 1 female (INBio CRI 001646398), *Limon Prov.*, "Amubri, A. C. Amistad", 70 m, 4–21 Dec. 1993, coll. G. Gallardo (INBio); 1 male (INBio CRI 001137303), same province, "Río Sardinas, R. N. F. S. Barra del Colorado", 10 m, 14–22 Aug. 1993, coll. F. Araya (INBio); 1 female (INBio CRI 0003051273), same province, Hitoy Cerere Station, 100 m, 11–25 May 1998, coll. E. Rojas (INBio).

Description. Male (holotype). General colouration olive green, but epicranium light green with whitish ocelli and olive green genae, pronotal disc reddish with some stains green phosphorescent, lateral lobes of pronotum olive green, hind femur with some white and dark brown stripes, tegmina transparent with brown patches as well as with apical part white and most of veinlets olive green. Posterior denticle of upper rostral crest thin and curved forwards almost as in *P. osae* but distinctly shorter and with obliquely truncate apex having hardly visible anterodorsal concavity in profile (Figs 70, 89); middle denticle of this crest somewhat higher than that of *P. osae*, rather wide, and with roundly convex dorsal edge (Fig. 89, 96); median ocellus oval, slightly transverse. Pronotal disc with tubercles weakly developed (mesozonal and metazonal tubercles inconspicuous; Figs 70, 79). Hind femur with six spines on ventro-external margin; ventro-internal margin of

this femur with two distal spines of similar shape; hind tibiae armed with nine spines on dorso-external margin and 13 spines on dorso-internal margin; genicular lobes of fore femur unarmed, but genicular lobes of all other femora with spine. Stridulatory vein of left tegmen with 30 teeth (Fig. 103). Cerci: outer lobe hook-like, as in *P. silvae* and *P. osae*; inner lobe more or less similar to that of *P. graciellae* and *P. osae* but with four marginal denticles (Fig. 122). Subgenital plate approximately as in *P. quirozi* and *P. osae*, i. e. its posteromedian notch not deep; however proximal edge of this notch almost straight (hardly sinuate; Fig. 130).

Variations. Rostral tubercles and cerci in males somewhat varied: posterior denticle of upper rostral crest sometimes slightly longer or hardly shorter, insignificantly less curved or with somewhat more curved apical part; apex of this denticle sometimes narrowly rounded or almost bifurcate in profile (Figs 109–117); inner lobe of cerci sometimes with five marginal denticles; position of these denticles also rather diverse.

Female. General appearance similar to that of male, although posterior denticle of upper rostral crest sometimes slightly reduced. Ovipositor almost indistinguishable from that of *P. osae* (Fig. 120).

Length in mm. Body with wings: male 34–34.5, female 36; pronotum: male 4.3–4.5, female 4.5; tegmina: male 27–27.5, female 28; hind femora: male 14–14.4, female 15; ovipositor 4.

Comparison. The new species is most similar to *P. svetlanae* by the shape of the posterior denticle of upper rostral crest, but it differs from the latter species in the apex of this denticle less bifurcate or not bifurcate and in the absence of characteristic lobule on inner dorsal edge of fore tibiae near distal edge of tympanum. From *P. peruana*, *P. verrucosa*, *P. bezverkhovi* and *P. polestshuki*, the new species differs mainly in the posterior denticle of upper rostral crest of male clearly longer and/or less bifurcate, and from all the other species of *Anaphidna*, in this denticle distinctly or much shorter.



Fig. 136. *Paraphidnia rubricorpus* sp. nov. Living male from Colombia in nature (© J. Cardona).

Etymology. The species is named in honour of Carlos Hernández (curator of arthropods in INBio, Costa Rica), in gratitude to his help for this study.

Paraphidnia (Anaphidna) rubricorpus

Cadena-Castañeda, sp. nov.

(Figs 72, 81, 91, 98, 105, 124, 132, 136)

Holotype. Male (INBIO CRI 000653528); **Costa Rica**, Heredia Prov., Braulio Carrillo Natural Park, Magsasay Station, 200 m., Dec. 1990 (INBio).

Paratypes. One male (INBIO 0004022886), **Costa Rica**, Arajuera Prov., “Valley River Roble”, 900–1000 m, 24 June 2006, coll. J. Azofeita (INBio); 1 male, **Colombia**, near border with Panama, “Chocó, Bahía Solano”, 80 m, Sept. 2012 (MUD).

Description. Male (holotype). General colouration dark red with yellow, greenish, whitish and dark brown marks (as in Fig. 136). Posterior denticle of upper rostral crest thin and straight, more or less similar to that of *P. graciellae* but somewhat shorter, more conical, with almost indistinct convexity on anteroventral edge, and with narrowly rounded (not almost bifurcate) apex (Fig. 72, 91); middle denticle of this crest almost as in *P. osae* (Fig. 91, 98); median ocellus circular. Pronotal disc with conspicuous

tubercles: metazonal tubercles with almost acute apex, other tubercles with blunt apex (Figs 72, 81). Hind femur with five spines on ventro-external margin, ventro-internal margin of this femur with one distal spine of similar shape; hind tibiae with ten spines on dorso-external margin and twelve spines on dorso-internal margin; genicular lobes of all femora with spine. Stridulatory vein of left tegmen with 31 teeth (Fig. 105). Cerci: outer lobe as in *P. osae*, *P. hernandezi* and *P. silvai*; inner lobe with lower projection hooked, almost as in *P. quirozi* but with four marginal denticles (Fig. 124). Subgenital plate almost as in *P. graciellae* but with subapical part slightly narrower (Fig. 132).

Variations. Other males without any distinct differences from holotype.

Female unknown.

Length in mm. Body with wings 42–43; pronotum 4; tegmina 25.5–26; hind femora 14–15; subgenital plate 2.2.

Comparison. The new species is distinguished from *P. mexicana*, *P. graciellae* and *P. lankesteri* by the posterior denticle of upper rostral crest somewhat shorter; additionally it is distinguished by this denticle straight (from the latter species), by a reddish (not greenish) general colouration (from *P. graciellae*), or by less numerous teeth (31 in-

stead of 27) on the stridulatory vein of left tegmen (from *P. mexicana*);. From *P. peruana*, *P. soetlanae*, *P. bezverkhovi*, *P. polestshuki*, *P. verrucosa*, *P. hernandezi*, *P. osae* and *P. silvae*, the new species differs in the above-mentioned denticle clearly longer, not bifurcate and/or not curved, and from *P. quirozi*, by the stridulatory vein of left tegmen with more numerous teeth (31 instead of 26).

Etymology. The species name originates from the Latin words “*rubrus*” (red) and “*corpus*” (body).

Paraphidnia (Anaphidna) rhinoceros

Cadena-Castañeda, *sp. nov.*

(Figs 71, 80, 90, 97, 104, 123, 131)

Holotype. Male (INBIO CRI 000955386); **Costa Rica**, Heredia Prov., Sarapiquí, Pueblo Nuevo, Finca Naranjo Valencia, 90 m, 9–30 Sept. 1992, coll. M. Ortiz (INBio).

Paratypes: One male (INBIO CRI 000955384), same locality, but 9–30 Feb. 1992, coll. M. Ortiz (MUD).

Description. Male (holotype). General colouration light brown, but epicranium light brown with yellowish genae, pronotum brown with yellowish lateral lobes, hind femora with white and dark brown stripes, and tegmina transparent with green patches on anal and costal regions. Posterior denticle of upper rostral crest very similar to that of *P. rubricorpus*, but its apical part slightly narrower and hardly curved forwards (Figs 71, 90); middle denticle of this crest rather wide and with roundly convex dorsal edge (Figs 90, 97); median ocellus oval, transverse. Pronotal disc with mesozonal and metazonal tubercles conspicuous; apex of these tubercles blunt (Figs 71, 80). Hind femur with six spines on ventro-external margin; ventro-internal margin of this femur with two distal spines of similar shape; hind tibia armed with nine spines on dorso-external margin and twelve spines on dorso-internal margin; genicular lobes of all femora with spine. Stridulatory vein with 26 teeth (Fig. 104). Cerci similar to those of *P. rubricorpus*, but outer lobe less curved

(almost as in *P. graciellae*), and inner lobe with three marginal denticles (Fig. 123). Subgenital plate similar to that of *P. osae* but with posteromedian notch somewhat deeper (almost as in *P. graciellae*, *P. rubricorpus* and *P. silvai*; Fig. 131).

Variations. Other male without any distinct differences from holotype.

Female unknown.

Length in mm. Body with wings 34; pronotum 4; tegmina 28; hind femora 14; subgenital plate 2.1.

Comparison. The new species is very similar to *P. rubricorpus* and *P. osae* but with the brownish (not reddish or greenish) colouration and less numerous stridulatory teeth (26 instead of 31 or 34). From *P. mexicana*, *P. lankesteri* and *P. graciellae*, it differs in the middle denticle of upper rostral crest clearly more convex dorsally (from the first species), posterior denticle of this crest less curved (from the second species), or apical part of the latter denticle not bifurcate in profile (from the third species); from *P. quirozi* and *P. silvai*, it differs in all the femoral genicular lobes with a spine; and from all the other species of *Anaphidna*, in the posterior denticle of upper rostral crest longer and not bifurcate.

Etymology. The species name is given after *Copiphora rhinoceros* (Tettigoniidae: Conocephalinae) from Costa Rica as an allusion to some similarity in the shape of head rostrum.

DISCUSSION

The representatives of the genus *Paraphidnia* exhibit a wide phenotypic plasticity making them difficult to identify. Specimens of the same species and from the same population may have a distinct variability in the characters which are very stable and useful for species delimitation in other genera of Dysoniini: shape of rostral and pronotal tubercles (see Figs 109–117), structure of stridulatory vein, wing venation, armament of legs and of male cerci. Some of such specimens may be mistakenly treated

as belonging to more than one species, if we underestimate this variability.

Moreover, sympatry among Neotropical Phaneropterinae is common: observations of the first co-author on the Amazonian canopy showed that two, three and more species of the same genus might live together in the same tree and even on the same branch: *Ceraia* (three species), *Euceraia* (four species), *Phylloptera* (six species); similar data were reported by Nickle & Castner (1995). In this connection, the overestimation of variability in a few sympatric species of *Paraphidnia* may lead us to erroneous treatment of these species as one very variable species.

Another problem of *Paraphidnia* taxonomy is the presence of rather numerous closely related species lacking any significant differences in the copulatory and other sexual structures. This may be the result of very recent and rapid adaptive radiation in the subgenus *Anaphidna*. For species delimitation in this subgenus, special acoustic and ethological studies may be very useful.

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