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Source: The Journal of the Lepidopterists' Society, 71(2) : 92-108

Published By: The Lepidopterists' Society

URL: https://doi.org/10.18473/lepi.71i2.a4

Journal of the Lepidopterists' Society
71(2), 2017, 92–108

A NEW GENUS OF ANDEAN MIMALLONIDAE (MIMALLONOIDEA), WITH THE DESCRIPTIONS OF FOUR NEW SPECIES

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ABSTRACT. *Isoscella*, **gen. n.**, is newly described in the family Mimallonidae with *Isoscella ventana*, **comb. n.** (Dognin, 1897), as its type species, transferring this taxon from *Psychocampa* Grote & Robinson, 1866. We describe and figure the female of *I. ventana* for the first time. Our investigation into this species resulted in the recognition of the following new species: *I. ecuadoriana*, **sp. n.**, from Ecuador, *I. leva*, **sp. n.**, from Peru and Bolivia, *I. peigleri*, **sp. n.**, from Colombia and Ecuador, and *I. andina*, **sp. n.**, from Ecuador and Peru. Both sexes of all species are figured, along with their genitalia. Finally, we discuss the potential close relatives of *Isoscella*.

Additional key words: *Isoscella*, gen. n., *Isoscella andina*, sp. n., *Isoscella ecuadoriana*, sp. n., *Isoscella peigleri*, sp. n., *Isoscella leva*, sp. n.

Until recently, very little revisionary work has been conducted on the family Mimallonidae, and no comprehensive study has utilized modern morphological or molecular methods to understand phylogenetic relationships and generic boundaries. Therefore, Mimallonidae pose a difficult problem in terms of classification.

Since 2012, eight new genera have been described to include likewise new species or previously described, enigmatic species (Herbin 2012, Herbin 2016, St Laurent 2016, St Laurent & Mielke 2016). The family Mimallonidae now contains 35 genera; therefore, the relative increase in the number of genera is high, and is evidence of the inadequacy of the historical generic framework of the family (Becker 1996, St Laurent unpublished).

We focus on a group of Andean Mimallonidae that share several external and genitalia characters, setting them apart from others in the family and hereby describe a new genus in which to place them. *Isoscella ventana* (Dognin, 1897) comb. n. is the only currently described taxon treated herein, which, based primarily on male genitalia, does not belong in its current genus, *Psychocampa* Grote & Robinson, 1866. We recognize three separate species currently all considered to be as *ventana*, describing two of them as new, as well as two additional unique species reported here for the first time.

MATERIALS AND METHODS

Dissections were performed as in Lafontaine (2004). Morphological (including genitalia) terminology follows Kristensen (2003). Genitalia preparations are either slide mounted (those from Museum Witt, Munich) or maintained in glycerol filled microvials to allow for three-dimensional analysis of complex structures.

Specimens from the following collections were examined:

AMNH	American Museum of Natural History, New York, New York, USA
CMNH	Carnegie Museum of Natural History, Pittsburgh, Pennsylvania, USA
CUIC	Cornell University Insect Collection, Ithaca, New York, USA
EMEC	Essig Museum of Entomology, University of California Berkeley, California, USA
MGCL	McGuire Center for Lepidoptera & Biodiversity, Gainesville, Florida, USA
MPUJ	Pontificia Universidad Javeriana, Bogotá, Colombia
MWM	Museum Witt, Munich, Germany
NHMUK	The Natural History Museum, London, U.K.
NHRS	Entomological Collections, Swedish Museum of Natural History, Stockholm, Sweden
UGCA	University of Georgia Collection of Arthropods, Athens, Georgia, USA
USNM	National Museum of Natural History [formerly United States National Museum], Washington D.C., USA

Figures were manipulated with Adobe Photoshop CS4, male genitalia are figured in natural color with CS4 "auto color" used to improve white backgrounds

(Adobe 2008). Genitalia were photographed in ethanol under glass, unless otherwise noted. All geographical coordinates are inferred based on the localities provided on specimen labels when explicit coordinates were not present. GPS data were acquired with Google Earth and Google Maps. Maps were made with SimpleMappr (Shorthouse 2010).

RESULTS AND DISCUSSION

ISOSCELLA, **new genus**

Type species: *Perophora ventana* Dognin, 1897

Etymology. The name for this genus is derived from elongate, isosceles triangle-like shape of the forewings, as well as from the shape the tegumen and uncus, which together also form a triangle.

Diagnosis. All species in the genus can be recognized by the following combination of external characters: narrow, elongate, triangular or subtriangular wings, and a single, circular to ovoid hyaline patch occupying the discal region of each wing. The male genitalia have triangular or subtriangular valves, a triangular uncus, a rectangular gnathos with a pair of thin, fingerlike projections mesally, as well as a pair of heavily sclerotized, outwardly curved arms and broad plates protruding outward from the base of the saccular region of the vinculum. Both pairs of arms and the plates are covered in setae. The most similar genus, *Roelmana* Schaus, 1928, containing the sole species *R. maloba* (Schaus, 1905) (but see remarks below), can be recognized by the light gray tornal and apical suffusions on the forewings and by the more robust, rounded gnathos of the male genitalia and more elongated vincular projections.

Description. Male. *Head*: Light orange to dark red or brown-red, interspersed with dark petiolate scales; antenna dark brown to dark yellow, basally bipectinate; labial palpus very small, indistinct, not extending beyond frons, colored as for head, segments not easily differentiable due to thick vestiture. *Thorax*: Coloration as for head, interspersed with dark petiolate scales, prothoracic collar lined with prominent gray scales. Coloration of legs as for thorax, slight pinkish hue evident in thick vestiture. Forewing length 21–38 mm, wingspan 42–65 mm. Forewing elongate, triangular, margin nearly straight, concave along falcate apex. Dorsum ground color pale orange, brown-orange, or purplish-brown. Overall lightly speckled by dark and bicolored petiolate scales. Antemedial line faint to nearly absent, wavy, black. Postmedial line nearly straight from tornus until just before Rs4 where line becomes fainter and angles perpendicularly to costa. Discal cell marked with oblong to nearly circular hyaline patch bisected by M_2. Ventrum similar to dorsum but generally more homogenously colored, darker petiolate scales more numerous and distinct, especially antemedially and medially, antemedial line absent, postmedial line reduced to wavy, outwardly curved traces in most species, or follows same pattern as on dorsum. Hindwing triangular or rounded, dorsum coloration and markings as for forewing dorsum, but antemedial line absent, postmedial line continuously dark to anterior wing margin, hyaline patch smaller, narrower, situated nearer to postmedial line, sometimes touching it. Hindwing ventrum follows same pattern as forewing ventrum. Frenulum apparently absent or highly reduced. Venation typical of Mimallonidae, namely *Cicinnus* Blanchard, 1852, but discal cell and all regions between veins particularly narrow considering elongation of wings in *Isocella*. *Abdomen*: Concolorous with thorax, or slightly darker orange-pink ventrally, distal tip with pair of elongated, dark scale tufts. Genitalia with vinculum widened basally with paired, setae covered, curved, hornlike structures emanating outward toward valves, valves with cup-like indentation where hornlike structures approach preventing interference with valves. Cup-like indentation variously lined with heavily sclerotized teeth of varying arrangement, in some species teeth absent, and in one species indentation absent. Second paired structure attached to vincular arms by membrane and weak sclerotization, this secondary structure surrounds either side of phallus, situated behind the more heavily sclerotized aforementioned arms, secondary structure edged with sharp setae pointed outward, length of setae variable. Uncus simple, triangular. Gnathos as two separate, thin, fingerlike processes reaching nearly to base of uncus, gnathos processes joined by narrow mesal bridge. Shape of valves variable, from triangular to rounded, weakly angled away from uncus. Juxta partially fused to phallus. Phallus somewhat cylindrical to substantially broadened, especially distally, distally encircled by short setae, vesica weak, roughly phallus-length, somewhat conical.

Female. *Head*: As in male but antennal rami shorter. *Thorax*: As in male. Forewing length 30.0–35.5 mm, wingspan 61–71 mm. Similar overall to male, but broader, margin slightly convex. Dorsum ground color as in male but with variation including individuals somewhat lighter and darker in shading. Postmedial line nearly straight from tornus until just before Rs4 where line becomes very faint and runs perpendicular to costa. Discal cell marked with oblong, somewhat B-shaped, hyaline patch bisected by M_2 and encircled by black scales. Forewing ventrum similar to dorsum but ground color uniformly lighter orange-yellow, darker petiolate scales more numerous and distinct; antemedial line absent, postmedial line nearly absent with only traces present near tornus and costa. Hindwing rounded, dorsum coloration and markings as in forewing dorsum, but antemedial line absent, postmedial line continuously dark to anterior wing margin, hyaline patch smaller, narrower, situated nearer to postmedial line. Hindwing ventrum follows same pattern as forewing ventrum. Frenulum apparently absent. *Abdomen*: As in male, but more robust, distal tufts of scales reduced. Genitalia robust; tergite of VIII forms posteriorly directed arch. Apophyses anteriores roughly same length as apophyses posteriores, but thicker proximally. Lamella antevaginalis as distally smooth, basally wrinkled concave plate of varying size. Lamella postvaginalis heavily sclerotized, broad, with amorphous masses covered in short, thick setae located on either side of lamella postvaginalis, either distinctly differentiated from lamella postvaginalis or homogenous in overall structure. Lamella postvaginalis smooth and variously structured mesally, from concave to outwardly projected. Ductus bursae short, not clearly differentiated from long, tubular corpus bursae. Base of papillae anales with robust sclerotizations dorsolaterally, covered in short, thick setae. Papillae anales somewhat box-like, covered in long, fine setae, setae much shorter basally.

Remarks. The closest relatives of *Isoscella*, based on similarities in male genitalia as well as arrangement and shape of the fore and hindwing hyaline patches, are currently scattered in several genera. Similarities are present in *Roelmana maloba*, *Cicinnus fenestrata* Jones, 1912, *C. brasiliensis* Herbin & Mielke, 2014, *Psychocampa doralica* Schaus, 1928, *P. pluridsicata* (Dognin, 1916), and *P. vitreata* (Schaus, 1905). Although these five species share similarities with *Isoscella*, they form a distinct group in which they are more similar to one another and to the type species of *Roelmana*, *R. maloba*, than to any species of *Isoscella*. It is therefore likely that these species belong in a single separate genus near *Isoscella*. The most conservative placement for these species would be in the currently monotypic *Roelmana* because it is the only genus for which the type species displays these male genitalia characteristics (J. G. Franclemont genitalia dissection 1427, CUIC). None of the previously listed species currently placed in *Cicinnus* and *Psychocampa* Grote & Robinson, 1866 are similar to the type species of their respective

genera, and thus *Roelmana* is the only available name to include these related species (St Laurent unpublished, Herbin 2012). These species share with *Isoscella* the following characters in male genitalia: a pair of long, fingerlike mesal projections of the gnathos, valvae with a mesal indentation, and paired vincular arms. However, unlike *Isoscella*, the gnathos is rounded and more heavily sclerotized, the valvae more sharply angled, and the vincular arms narrower and longer. Revisions of *Cicinnus*, *Psychocampa*, and *Roelmana*, as well as phylogenetic analyses of the family will eventually help tease apart these groups and allow for a more robust consolidation of these similar species (likely to be placed) in *Roelmana*. We do believe, however, that male genitalia characteristics are significantly different enough in *Isoscella* to warrant the placement of species covered here, as separate from *Roelmana sensu lato*. *Isoscella* is an entirely Andean genus, whereas *Roelmana* is broadly distributed in Central America and throughout South America, including low elevations, therefore we do not include the latter in the current treatment.

Key to species of *Isoscella* gen. n.

1 Forewing postmedial line nearly straight, diagonal on dorsum, outwardly curved toward wing margin on ventrum of wing (Figs 1–10, 12–14).....**2**

- Forewing postmedial line with the same, straight, diagonal pattern on both dorsum and ventrum of wing (Figs 15–17)…....…***I. andina* sp.n.**

2 Medial area, especially along the costa, light orange to orange-brown (old specimens) or pink to salmon (fresh specimens) colored. Medial and submarginal areas contrasting, submarginal area nearly always much darker than medial area…....**3**

- Medial area, especially along the costa, pale to very dark brown (old specimens) or purplish brown (fresh specimens) colored (Figs 12–13). Medial and submarginal areas barely contrasting, both areas very dark overall .....***I. peigleri* sp. n.**

3 Male forewing with submarginal area suffused with black, forming a lunule-like pattern, valva indentation teeth usually absent; female genitalia with lamella postvaginalis bent mesally, rectangular laterally. Ecuador.....…. .....***I. ecuadoriana* sp. n.**

- Male forewing with submarginal area homogenously colored, orange, black suffusion absent or faint, not forming lunule shape, valva indentation teeth usually present or very reduced; female genitalia with lamella postvaginalis bowl-like or keeled mesally, somewhat globularly expanded laterally. Venezuela, Colombia, Peru, and Bolivia.....**4**

4 Dorsum usually with speckling due to numerous dark petiolate scales, including submarginally, male hindwing margin convex. Valva indentation teeth reduced, genitalia structures overall less robust (compare Figs 19, 20 to 23, 24). Northern Andes: Venezuela and Colombia ……..….....***I. ventana* comb. n.**

- Speckling mostly absent from dorsum, especially reduced submarginally, male hindwing margin nearly straight with slightly accentuated anal angle, if convex consider degree of speckling and geographic distribution. Valva indentation teeth heavily sclerotized, genitalia structure overall very robust. Southern Andes Mountains: Peru and Bolivia……..…..…....***I. leva* sp. n.**

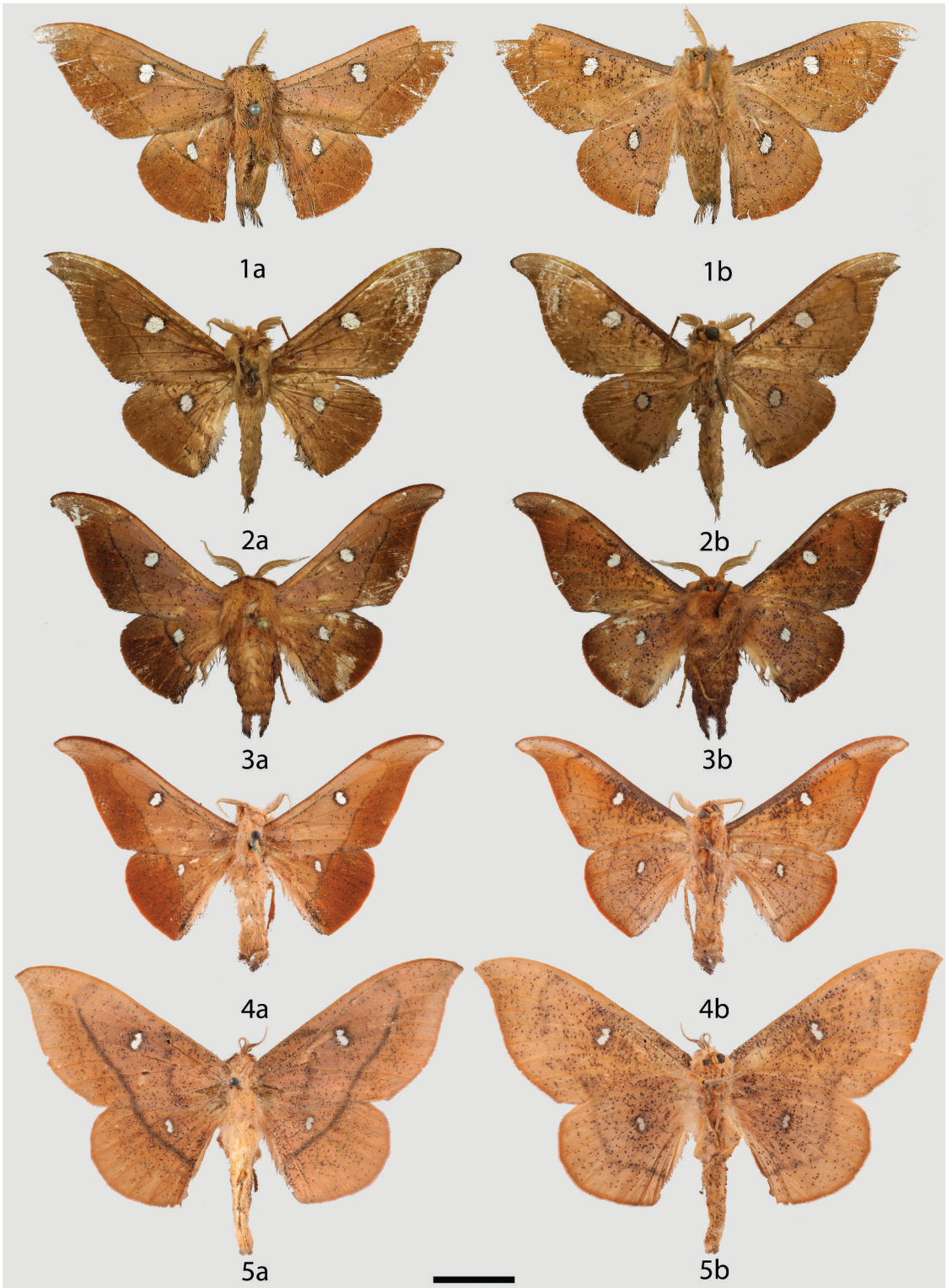
Isoscella ventana (Dognin, 1897), **new combination**
(Figs 1–5, 19, 20, 29, 34)

Perophora ventana Dognin, 1897: 243–244
Psychocampa ventana; Schaus 1928: fig. ♂ 87a
Psychocampa ventana; Gaede 1931
Psychocampa ventana; Becker 1996

Holotype. VENEZUELA: Mérida: ♂, MÉRIDA, TERRE TEMPÉRÉE, VÉNÉZUELA/ *Perophora Ventana* Druce, type/ Type No. 29679/ Dognin Collection/ [+ 2 illegible labels]/ USNM-Mimal: 1007/ St Laurent diss.: 8-22-16:1/ (USNM, examined).

Additional material examined. (18 ♂, 2 ♀ total) **VENEZUELA: Mérida:** 1 ♂, Pedregosa [Norte], 3000 m: 1897, Briceno, St Laurent diss.: 4-4-16:1, NHMUK010355074 (NHMUK). 3 ♂, Mérida: Briceno NHMUK010355076 (NHMUK, 2 ♂); Dognin Collection, USNM-Mimal: 1231 (USNM, 1 ♂). 1 ♂, Mérida: Ex. Coll. Ed. Brabant 1920, Joicey Coll., Brit. Mus. 1925-157 (NHMUK). **Barinas:** 2 ♂, Near Altamira village, 8°50'N, 70°30'W, 750 m: 11–22.XI.2012, Y. Bezverkhov, coll. Dr. Ronald Brechlin leg. [label reads "Merida" but this is incorrect], genitalia prep. 30.004 (MWM). **No state:** 1 ♂, Collection Wm Schaus, USNM-Mimal: 1232, St Laurent diss.: 5-3-16:1 (USNM). **COLOMBIA: Boyacá:** 1 ♂, Garagoa, Reserva "El Secreto", 2320 m: 12.X.2001, T. luz [light] at 10:20 pm, nublado [cloudy], col. Zubiria et al. (MPUJ). 1 ♂, Garagoa: 9.IV.2003, A. Ríos et al. (MPUJ). **Cundinamarca:** 1 ♂, Pacho, Eastern Cordillera, 2200 m: Coll. Fassl, Dognin Collection, USNM-Mimal: 1233 (USNM). 1 ♂, 1 ♀, Pacho, 2200 m: Coll. Fassl, NHRS-TOBI 1949, 1950 (NHRS). 1 ♀, Finca San Pablo, 3 km. N. Albán, 1800 m: 1–12.VIII.1967, P. & B. Wygodzinsky [leg.], St Laurent diss.: 3-7-16:1 (AMNH). **Valle de Cuaca:** 6 ♂, 4 km NW San Antonio, 6500': 5.X.1958, A. H. Miller [leg.] (EMEC).

Diagnosis. *Isoscella ventana* can be distinguished from *I. ecuadoriana*, sp. n., *I. leva*, sp. n., and *I. peigleri* sp. n. by the relatively small size (wingspan and overall size of genitalia); shorter, broader wings; and usually larger hyaline patches. The phallus is slightly shorter and broader than in other species. This species is the only member of the genus present in Venezuela, and is



FIGS. 1–5. Adults of *Isoscella ventana*, a=recto, b=verso. **1.** Male holotype, Venezuela, Meridá, Terre Tempérée [photo courtesy of Daniel Herbin] (USNM). **2.** Male, Venezuela, Meridá, Pedregosa, 3000 m (NHMUK). **3.** Male, Venezuela, Barinas, near Altamira village, 750 m (MWM). **4.** Male, Colombia, Cundinamarca, Pacho, 2200 m (NHRS). **5.** Female, Colombia, Cundinamarca, Pacho, 2200 m (NHRS). Scale bar=1 cm.

FIGS. 6–10. Adults of Isoscella, a=recto, b=verso. 6. *I. ecuadoriana*, male holotype, Ecuador, Napo, Cordillera Guacamayos, 2181 m (MWM). **7.** *I. ecuadoriana* male paratype, Ecuador, Napo, Puente Azuela, 1560 m (MGCL). **8.** *I. ecuadoriana* female paratype, Ecuador, Napo, 5 km SE Cosanga, 2240 m (MWM). **9.** *I. leva* male holotype, Peru, Puno, Carabaya, Santo Domingo, 6000 ft (NHMUK). **10.** *I. leva* female paratype, Peru, Cusco, Huayapata, 2400 m (MWM). Scale bar=1 cm.

Fig. 11. *Isoscella ecuadoriana* in situ, Ecuador, Napo, Wildsumaco Biological Station, ~1400 m (Photo courtesy of Chris Hamilton, used with permission).

apparently allopatric from the larger, darker *I. peigleri* sp. n., which is found farther south in Colombia and Ecuador, but see remarks.

Description. *Head*: As for genus. *Thorax*: As for genus. Forewing length 25–27 mm (mean=25.6 mm), wingspan 49–54 mm (n=5), forewing as for genus but less elongate, margin slightly convex, concave along falcate apex. Ground color pale pinkish orange or dull pinkish brown. Discal hyaline patch large relative to small wing. Forewing ventrum as for genus, but generally darker than dorsum due to high concentration of dark petiolate scales. Hindwing rounded, dorsum coloration, markings as in forewing dorsum. Hindwing ventrum patterning as for forewing ventrum but lighter overall due to lower concentration of dark petiolate scales. *Abdomen*: Concolorous with thorax, slightly darker orange-pink ventrally, distal tip with pair of elongated scale tufts terminating in dark scales. Male genitalia (Figs 19, 20) (n=5) as for genus but teeth of cup-like indentation of valva reduced or absent. Valva broad, somewhat pointed apically. Phallus narrow, mostly smooth, elongate, notched apically due to narrow extension of sclerotization. **Female.** *Head*: As in male but antennal rami shorter. *Thorax*: As in male. Forewing length 33.5 mm, wingspan 62 mm (n=1); forewing similar overall to male, but broader, margin slightly convex. Ground color as in male but somewhat lighter, paler coloration extends outward from medial region nearly to apex beyond postmedial line. Discal cell marked with oblong, somewhat B-shaped, hyaline patch bisected by M_2 and encircled by black scales. Forewing ventrum similar to dorsum but ground color uniformly lighter pale orange, darker petiolate scales more numerous and distinct; antemedial line absent, postmedial line nearly absent with only traces present near tornus and costa. Wing margins darker orange-brown, appearing somewhat singed. Hindwing rounded, markings and coloration as for forewing dorsum, but antemedial line absent, postmedial line reduced to traces. Hindwing ventrum pattern as for forewing ventrum. *Abdomen*: As in male but more robust. Genitalia (Fig. 29) (n=1) robust; tergite of VIII forms smooth, posteriorly directed arch. Apophyses anteriores roughly same length as apophyses posteriores, but thicker proximally. Lamella antevaginalis wide, robust, concave, smooth distally, wrinkled basally; lamella postvaginalis broad with amorphous masses covered in short, thick setae located on either side. Ductus bursae short, not clearly differentiated from long, tubular corpus bursae. Base of papillae anales with robust sclerotizations dorsolaterally, covered in short, thick setae. Papillae anales somewhat box-like, covered in long, fine setae, setae much shorter basally.

Distribution (Fig. 34). *Isoscella ventana* is an Andean species found in northwestern Venezuela and central Colombia, at elevations of 750–3000 m.

Remarks. In addition to the discussion offered in the remarks of *Isoscella*, we transfer *I. ventana* from *Psychocampa* due to the complete disagreement in male genitalia characters with *P. concolor* (Grote & Robinson, 1866), the type species of *Psychocampa*. *Psychocampa sensu stricto* is restricted to a group of similar species that have male genitalia bearing strong similarity to that of *P. concolor*, and thus several species currently placed in this genus will eventually be transferred out of *Psychocampa*.

We here describe and figure the female as well as the genitalia of both sexes of *I. ventana* for the first time. Previous literature references to *Isoscella ventana* (as *Psychocampa ventana*) include *I. ecuadoriana*, sp. n. and *I. leva*, sp. n. as well, but we restrict the name *I. ventana* to those populations of northwestern Venezuela and central Colombia, nearer to the type locality of *I. ventana*.

Isoscella ventana is generally consistent in wing shape and orange to orange-brown coloration, but we note significant variation in size of discal hyaline patches. Unfortunately, large series of material from Venezuela and Colombia are lacking, thus it is difficult to determine if variation within this species is correlated with distribution in Venezuela and Colombia. We are also aware of a darker specimen (Fig. 3) from Venezuela, but collecting locality, wing shape, maculation, and genitalia are all consistant with *I. ventana*.

Six specimens in the EMEC from Valle de Cuaca are rather variable in coloration and were collected near the locality of the putative Colombian population of *I. peigleri* (see remarks of *I. peigleri*, sp. n.). These specimens in western Colombia further support the need to locate additional material from surrounding regions to determine the actual distribution of *I. ventana* and *I. peigleri*, sp. n., in Colombia.

Isoscella ecuadoriana, new species

(Figs 6–8, 11, 21, 22, 30, 34)

Psychocampa ventana; Piñas and Manzano-Pesántez 1997, fig. 448 (see remarks)

Psychocampa ventana; Piñas 2007, fig. 217 (see remarks)

Holotype. ECUADOR: Napo: ♂, ECUADOR, NAPO Prov., Cordillera Guacamayos, 0°37'15''S; 77°49'28''W, 11.11.2011; H=2181, leg. V. Siniaev & O. Romanov/ Genitalpräparat Heterocera Nr. 29.262 Musuem WITT München/ HOLOTYPE ♂ *Isoscella ecuadoriana* St Laurent & Carvalho, 2017 [handwritten red label]/ (MWM).

Paratypes. (30 ♂, 1 ♀ total) **ECUADOR: Napo:** 2 ♂, Puente, 1560 m: 1.IV.1976, Coll. Vénédictoff, Allyn Museum Acc. 1986-26 (MGCL). 4 ♂, 1 ♀, 5 km SE Cosanga, 0°37'14''S, 77°54'08''W, 2240 m: 22.I.2012, R. Brechlin & V. Siniaev leg., genitalia prep. 29.244 MWM (MWM). 2 ♂, Cosanga, 2150 m: 4–5.I.2005, Andreas Riekert leg. (MWM). 1 ♂, 6 km SE Cosanga, 0°37'14''S, 77°54'08''W, 2240 m: 22.I.2012, R. Brechlin & V. Siniaev leg. (MWM). 1 ♂, Cordillera Guacamayos, 0°37'15''S, 77°49'28''W, 2181 m: 11.XI.2011, V. Siniaev & O. Romanov leg. (MWM). 2 ♂, Papallacta, Rio San Pedro, 0°22'56''S, 78°7'27''W, 3010 m: 4.XI.2011, V. Siniaev & O. Romanov leg.; 18.I.2012, R. Brechlin & V. Siniaev leg., genitalia prep. 30.002 (MWM). **Morona-**

FIGS. 12–17. Adults of *Isoscella*, a=recto, b=verso. **12.** *I. peigleri*, male holotype, Ecuador, Carchi, Road El Chical to Carolinae, 1970 m (MWM). **13.** *I. peigleri* [putative], male, Colombia, Tolima, San Antonio, 5800 ft (NHMUK). **14.** *I. peigleri*, female paratype, Ecuador, Cotopaxi, San Francisco de Las Pampas, Otonga, 2600 m (CMNH). **15.** *I. andina*, male holotype, Peru, Junín, Cerro Pichita Res. Sta. near San Ramón, 2165 m (MGCL). **16.** *I. andina*, male paratype, data as for Figure 15. **17.** *I. andina*, [putative], female, Ecuador, Morona Santiago, Road Gualaceo to Plan de Milagro, 2601 m (MWM). Scale bar=1 cm.

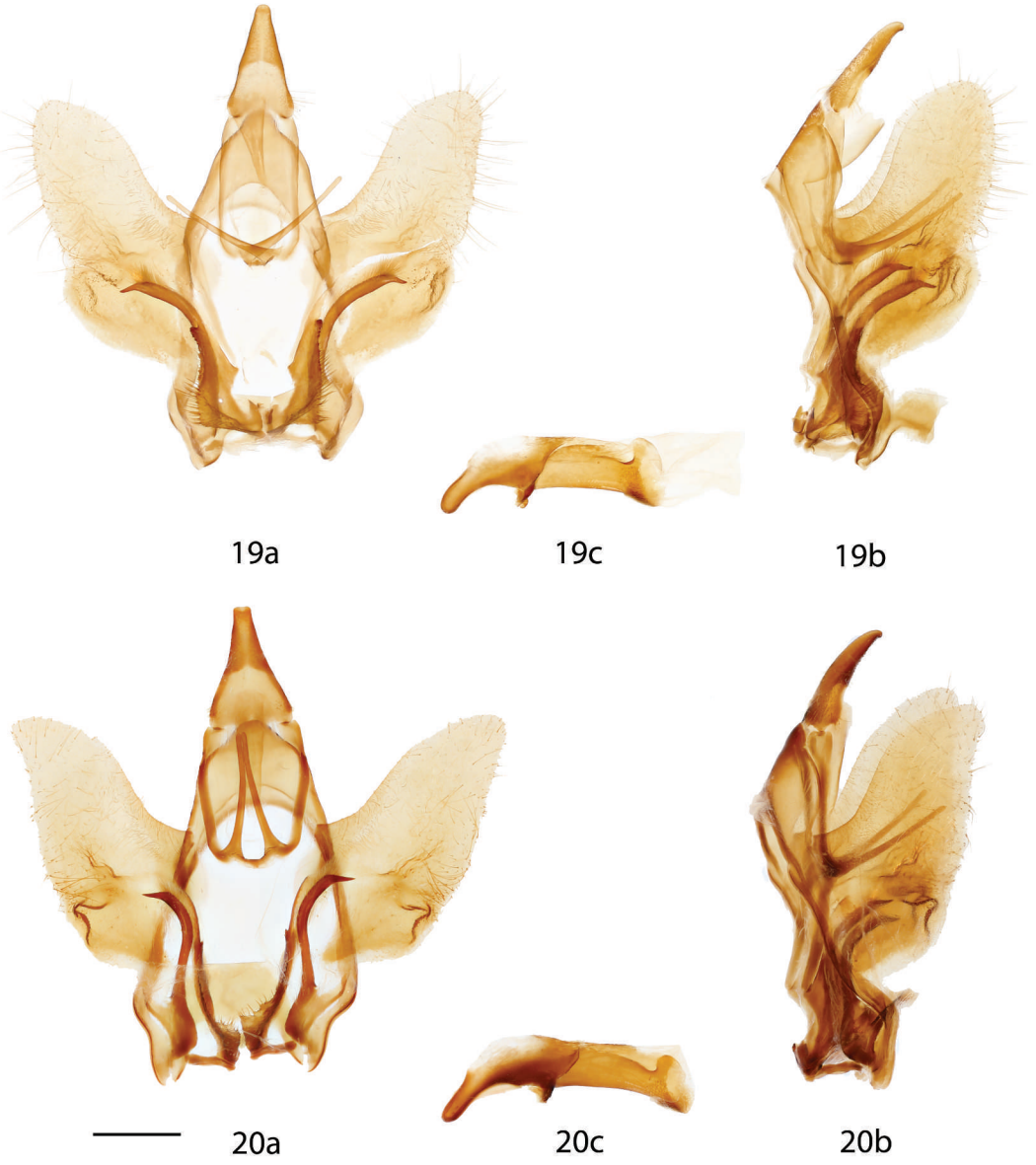
FIG. 18. Putative specimen of *I. peigleri* in situ, Ecuador, Imabura, Cuellaja, Intag Valley, 2400 m (Photo courtesy of Andreas Kay, used with permission).

Santiago: 1 ♂, 9 km W Plan de Milagro to Gualaceo, 3°00'04''S, 78°30'49''W, 2375 m: 6–7.III.2013, Ackermann, Käch, & Dr. R. Brechlin leg., genitalia prep. 30.005 (MWM). 2 ♂, Road Gualaceo-Plan de Milagro, 3°0'21''S, 78°29'53''W, 2033 m: 22.XI.2011, V. Siniaev & O. Romanov leg. (MWM). 7 ♂, Road Gualaceo-Plan de Milagro, 3°01'24''S, 78°35'06''W, 2157 m: 21.XI.2011, V. Siniaev & O. Romanov leg. (MWM). 1 ♂, 34 km Road Plan de Milagro to Gualaceo, 3°00'13''S, 78°38'46''W, 3200 m: 30.I.2012, R. Brechlin & V. Siniaev leg. (MWM). 4 ♂, 34 km Road Plan de Milagro to Gualaceo, 3°01'24''S, 78°35'6''W, 2157 m: 28.I.2012, R. Brechlin & V. Siniaev leg. (MWM). 1 ♂, 9 km Road Plan de Milagro to Gualaceo, 3°00'04''S, 78°30'49''W, 2375 m: 26.I.2012, R. Brechlin & V. Siniaev leg. (MWM). **Zamora-Chinchipe:** 1 ♂, 4.5 km N Zamora, 4°01'51''S, 78°57'29''W, 1270 m: 24.II.2012, R. Brechlin & V. Siniaev leg. (MWM). **Loja:** 1 ♂, Road Loja-Zamora, 3°58'45''S, 79°08'28''W, 2700 m: 22.II.2012, R. Brechlin & V. Siniaev leg. (MWM). – Paratypes with the following yellow label: PARATYPE ♂/♀ *Isoscella ecuadoriana* St Laurent & Carvalho, 2017.

Additional specimens/photographs examined. [Not included in type series] (4 ♂ total) **ECUADOR: Tungurahua:** 1 ♂, Baños [Baños de Agua Santa?], 1800 m: 16.II.1940, WCM leg., St Laurent diss.: 2-26-16:2 [locality data not entirely clear] (CUIC). **Napo:** 1 ♂, Cosanga, Anaycu Biological Station: live specimen photographed by Andreas Kay. 1 ♂, Wildsumaco Biological Station, 0°40'17.2''S, 77 °35'55.1''W, ~1400 m: live specimen photographed by Chris Hamilton (Fig. 11). 4 ♂, Wildsumaco Biological Station, 0°40'17.2''S, 77 °35'55.1''W, ~1400 m: 1–14.VIII.2016, Kawahara + Barber Labs et al., DNA voucher numbers 40624, 40641, 41026, 43142 (MGCL, molecular collection). **Azuay:** 1 ♂, Oriente, Plan de Milagro, 2100 m: Figured in Piñas and Manzano-Pesántez (1997).

Diagnosis. This species is recognizable by the contrast between the medial and submarginal areas; black and gray scaling along the particularly elongated, falcate forewing apex; and by the male genitalia which have elongate, smooth valves and usually lack the heavily sclerotized teeth of the mesal valve indentation (if present, they are highly reduced). Female genitalia are also unique in having a rectangular, but mesally bent (though not projected outward as in *I. leva*, sp. n.) lamella postvaginalis with the setae covered portions largely homogenous with the smooth portion. *Isoscella peigleri*, sp. n. and *I. andina*, sp. n. are also known from Ecuador, but these species are much darker, dark purplish brown (*I. peigleri*, sp. n.) or red (*I. andina*, sp. n.), rather than salmon to pink-orange as in *I. ecuadoriana*. However, some specimens of *I. ecuadoriana* are quite dark (see Fig. 11) when fresh or alive, such that the medial ground color is purplish brown and more similar to that of *I. peigleri*, sp. n. Despite this, the contrast between medial and brown-orange submarginal areas is still diagnostic of *I. ecuadoriana*. Furthermore, *I. andina* sp. n. is a much smaller species and neither this species nor *I. peigleri*, sp. n. is so far known to be sympatric with *I. ecuadoriana* in Ecuador.

Description. Male. *Head*: As for genus. *Thorax*: As for genus. Forewing length 28–32 mm (mean=30.4 mm), wingspan 50–65 mm (n=9); forewing dorsum as for genus but particularly elongate, apex falcate. Ground color pale pinkish orange, darker orange submarginal area strongly contrasting with lighter antemedial and medial areas. Some specimens darker when very fresh, appearing almost purple medially. Apex marked with black and gray scales, black scales of apex continue as dark, concave suffusion along postmedial line until tornus. Fringe rather contrasting, vibrant pale orange. Forewing ventrum as for genus, but with high concentration of dark petiolate scales and darker orange suffusion medially and along costa. Hindwing subtriangular, dorsum coloration, markings as in forewing dorsum. Hindwing ventrum with continuation of pattern of forewing ventrum but lighter overall. *Abdomen*: As for genus, concolorous with thorax slightly darker orange-pink ventrally. Genitalia (Figs 21, 22) (n=4) as for genus but teeth of cup-like indentation of valva usually absent, though minute teeth occasionally present. Valva elongated, smooth, narrow. Phallus narrow, mostly smooth, elongate, notched apically due to narrow extension of sclerotization. **Female.** *Head*: As in male but antennal rami shorter. *Thorax*: As in male. Forewing length 32.5 mm, wingspan 71 mm (n= 1); forewing similar overall to male, but broader, margin slightly convex. Dorsum ground color as in male but somewhat more pink with faint black suffusion medially, black and gray suffusions near apex and submarginally absent, postmedial line less well-defined after passing Rs4. Discal cell marked with oblong hyaline patch bisected by M_2 and encircled by black scales. Forewing ventrum similar to dorsum but ground color uniformly lighter orange-yellow, darker petiolate scales more numerous and distinct; antemedial line absent, postmedial line nearly absent with only traces present near tornus and costa. Wing margins darker orange-brown, appearing somewhat singed. Hindwing rounded, dorsum coloration, markings as for forewing dorsum, but antemedial line absent, postmedial line continuously dark to anterior wing margin, hyaline patch smaller, narrower, situated nearer to postmedial line. Hindwing ventrum with continuation of pattern of forewing ventrum but pinker rather than orange. *Abdomen*: Concolorous with thorax, slightly darker orange



FIGS. 19, 20. Male genitalia of *Isoscella ventana*, a=ventral, b=lateral, c=phallus. **19.** Venezuela, Meridá, Pedregosa, 3000 m, St Laurent diss.: 4-4-16:1 [vesica partly everted] (NHMUK). **20.** Colombia, Cundinamarca, Pacho, 2200 m, St Laurent diss.: 4-29-16:2 [vesica not everted] (USNM). Scale bar=1 mm.

ventrally. Genitalia (Fig. 30) (n=1) robust; tergite of VIII forms smooth, posteriorly directed arch, arch slightly accentuated mesally. Apophyses anteriores roughly same length as apophyses posteriores, but apophyses posteriores more robust. Lamella antevaginalis wide, not robust, wrinkled. Lamella postvaginalis rectangular, bent mesally, either side of lamella postvaginalis covered in short setae, setae covered region not as distinct structure from smooth mesal portion. Ductus bursae short, not clearly differentiated from corpus bursae, corpus bursae lost [absent in single genitalia preparation]. Base of papillae anales with weak sclerotizations dorsolaterally, covered in short, thick setae. Papillae anales box-like, covered in long, fine setae, setae much shorter basally.

Distribution (Fig. 34). This new species is known only from Ecuador at elevations of 1270–3200 m.

Etymology. *Isoscella ecuadoriana* is named for Ecuador, the only country from which this taxon has been collected.

Remarks. *Isoscella peigleri*, sp. n. is also known from Ecuador, however, it seems to be allopatric with *I. ecuadoriana*, which is restricted to the eastern Andes of Ecuador, while *I. peigleri*, sp. n. is from northwestern Ecuador on the western side of the Andes. Characters given in the diagnosis, namely the dark red-purple coloration of *I. peigleri*, sp. n. and genitalia, allow differentiation of these two species.

Both Piñas and Manzano-Pesántez (1997) and Piñas (2007) figure

the same specimen of *I. ecuadoriana* as *Psychocampa ventana*. The locality data for this specimen is given as "Plan de Milagro, Azuay, Oriente, Ecuador" which probably refers to a location in or near Azuay Province on the eastern slopes of the Andes. We include this data here as it is the only record of *Isoscella* from Azuay Province.

Isoscella leva, new species

(Figs 9, 10, 23, 24, 31, 34)

Psychocampa ventana; Schaus 1928 [in part]

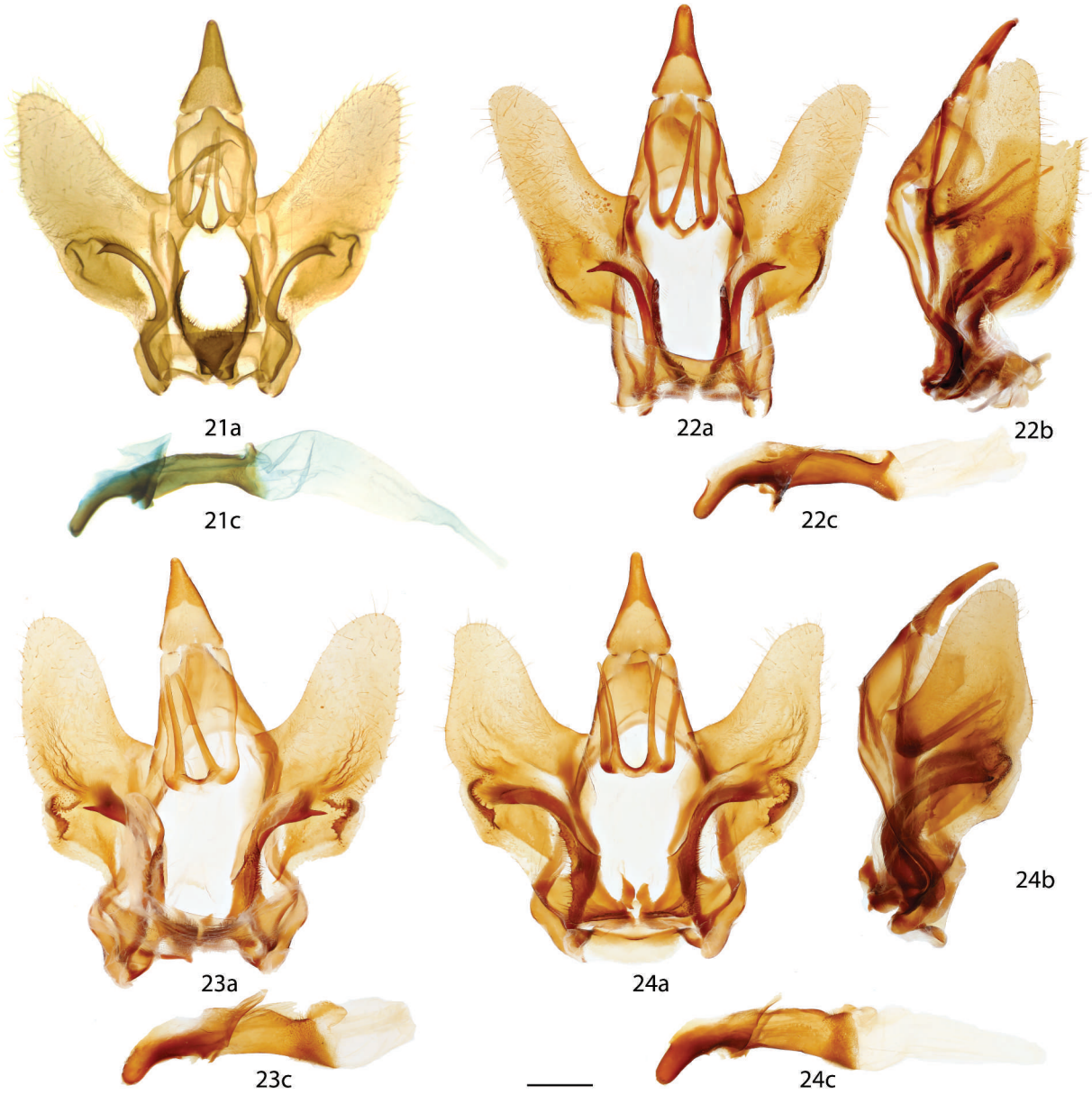
Holotype. ♂, **PERU: Puno:** S. Domingo, Carabaya [Puno], 6000 ft., VI. 02, Dry seas[on]. (Ockenden)/ Rothschild Bequest BM 1939-1, NHMUK010355077/ St Laurent diss.: 5-3-16:2/ HOLOTYPE ♂ Isoscella leva St Laurent & Carvalho, 2017 [handwritten red label]/ (NHMUK).

Paratypes. (35 ♂, 5 ♀ total) **PERU: Cusco:** 1 ♂, Wayqecha Biological Station, 13°10'S, 71°35'W: 30.X.2010, Charles V. Covell Jr. leg., C.V. Covell colln., MGCL Accession 2013-5 (MGCL). 1 ♀, Huayapata, 2400 m: II.2005, local people leg., Coll. Frank Meister (MWM). 5 ♂, Reyna Virgen, 2400 m: XII.2005 (4 ♂), XII.2005–I.2006 (1 ♂), R. Marx leg., Coll. F. Meister 17291 Prenzlau (MWM). 1 ♂, Nueva Virgen, 2500 m: XI.2005–XII.2005, local people leg., Coll. F. Meister 17291 Prenzlau (MWM). 1 ♂, Alfamayo, 2500 m: I–II.2006, R. Marx leg., Coll. F. Meister 17291 Prenzlau, genitalia prep. 29.263 MWM (MWM). 1 ♂, Vallé de Quillabamba, 2500 m: XI–XII.2005, local people leg., Coll. F. Meister 17291 Prenzlau (MWM). 1 ♂, Reyna del Carmen, 2400 m: II–III.2006, R. Marx leg., Coll. F. Meister 17291 Prenzlau (MWM). 1 ♂, San Pedro, Manu Park, 1800 m: II.1998 (MWM). 1 ♀, Manu Park, San Pedro, 1800 m: III.1997, local people leg. (MGCL). **Puno:** 7 ♂, 3 ♀, Carabaya, Santo Domingo, 6000 ft: VI.1901 (1 ♂); V.1902 (1 ♂); VI.1902, St Laurent diss.: 7-7-16:1 [♀], (5 ♂, 3 ♀); dry season, G. Ockenden [leg.], Joicey Coll., Brit. Mus. 1925-157, Rothschild Bequest B.M. 1939-1, NHMUK010355078 (NHMUK). 3 ♂, Santo Domingo, Carabaya [Puno], 6500 ft: X.1902, dry season (2 ♂), XII.1902, wet season (1 ♂), G. Ockenden [leg.], Rothschild Bequest B.M. 1939-1 (NHMUK). 1 ♂, Carabaya, Tinguri, 3400 ft: VIII.1904, dry season, G. Ockenden [leg.], Rothschild Bequest BM 1939-1, St Laurent diss.: 4-4-16:3, NHMUK010355079 (NHMUK). 1 ♂, Oconeque, Carabaya [Puno], 7000 ft: G. Ockenden [leg.], Joicey Coll., Brit. Mus. 1925-157 (NHMUK). 1 ♂, Santo Domingo to Limbani, 3000–9000 ft: VI.1904, dry season, G. Ockenden [leg.], Rothschild Bequest B.M. 1939-1 (NHMUK). **BOLIVIA: La Paz:** 1 ♂, Rio Songo [Río Zongo], 750 m: Coll. Fassl, Dognin Collection, USNM-Mimal: 1234, St Laurent diss.: 5-3-16:3 (USNM). 3 ♂, Rio Songo [Río Zongo], 750 m: Coll. Fassl, NHRS-TOBI 1946–1948 (NHRS). 1 ♂, North Yungas, Road Caranavi to Coroico, ca. 100 km NE La Paz, ca. 16.2°S, 67.6°W, 1000–1800 m: V–VI.2009, R. Brechlin & F. Meister leg. (MWM). **Cochabamba:** 1 ♂, El Limbo [Chapare, Alto Chapare]: 9.V.1954, Allyn Museum Acc. 1966-1 (MGCL). 1 ♂, El Limbo [Chapare, Alto Chapare], 2011 m: 15.V.1954, 1966-1 (MGCL). 1 ♂, Chapare, Incachaca, 2220 m: IV.1947, Allyn Museum Acc. 1966-1, St Laurent diss.: 8-29-16:4 (MGCL). 1 ♂, Incachaca: J. Steinbach [leg.], Collection Wm Schaus, USNM-Mimal: 1236 (NHMUK). 1 ♂, Sant [San?] Pedrito, 33 km SW Villa Tunari, 17°4.4'S, 65°41.5'W, 1070 m: 10–12.X.2010, V. Sinjaev & O. Romanov leg., coll. Dr. Ronald Brechlin (MWM). **Santa Cruz:** 1 ♂, Amboro National Park, 16 km N Mairana, 17°59.0'S, 63°59.5'W, 1900 m: 3–4.XI.2010, V. Sinjaev & O. Romanov leg., coll. Dr. Ronald Brechlin, genital prep. 30.003 (MWM). – Paratypes with the following yellow label: PARATYPE ♂/♀ *Isoscella leva* St Laurent & Carvalho, 2017.

Additional specimens examined. [Not included in type series] **PERU: Piura:** 1 ♂, Penaci, Motupe, 1500 m: V.2005, R. Marx leg., Coll. F. Meister 17291 Prenzlau (MWM). **BOLIVIA: Santa Cruz:** 1 ♂, Achira, rd. to Amboro National Park, 5800 ft: 14–20.XI.2003, Morris, Nearns, Wappes leg., "*Psychocampa* sp. (?) *ventana* Dognin (or near) Det. C.L. Smith (UGCA). **Cochabamba:** 1 ♂, Yungas de Palmar, 2000 m: [collector name illegible, near Ziebke], HRP No. 1310, USNM-Mimal: 2431 (USNM).

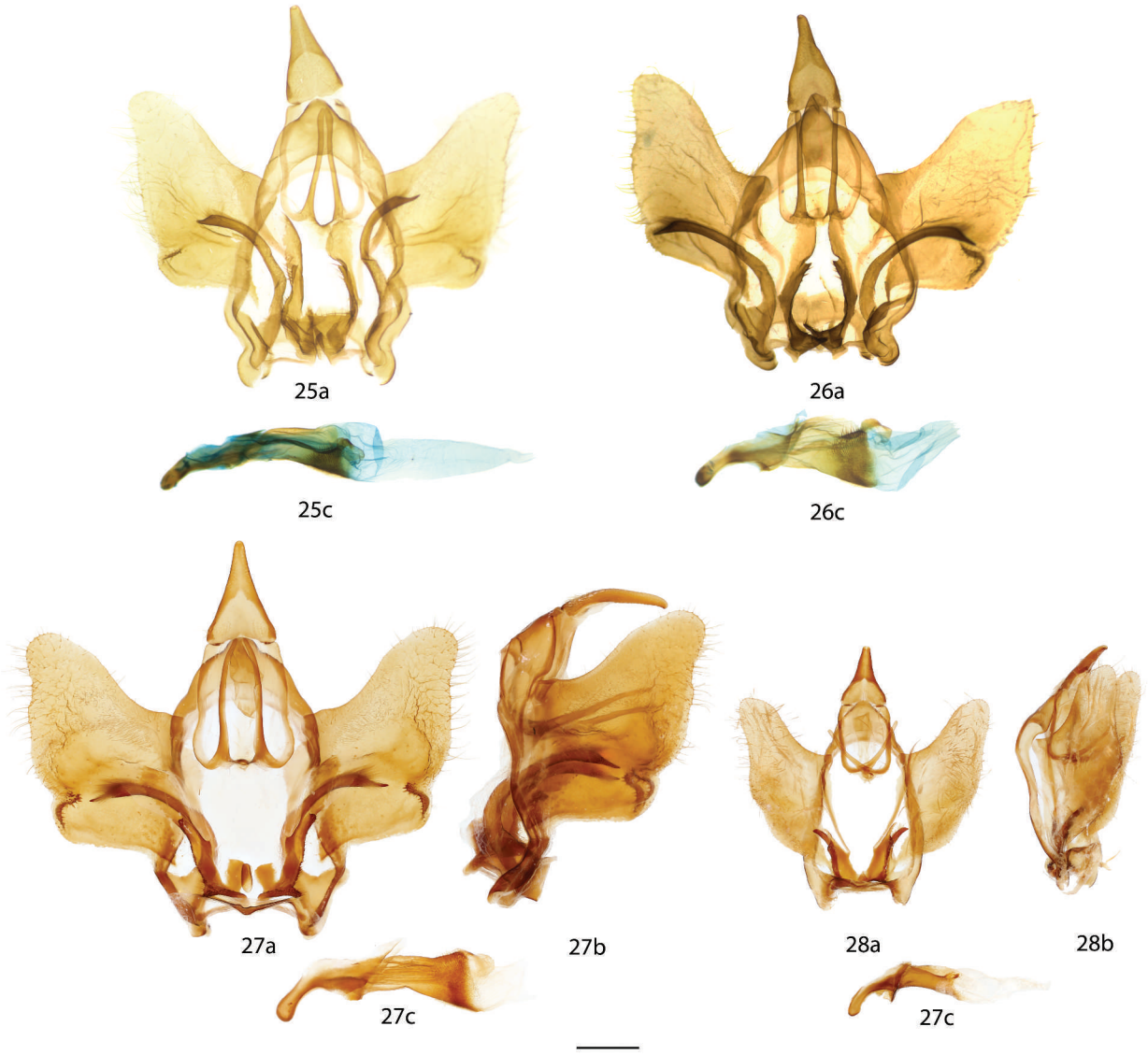
Diagnosis. In wing size and shape, this southernmost *Isoscella* species is most similar to *I. ecuadoriana*; the wings are highly elongated, but the apex is not as falcate. The coloration, however, differs, being more subdued pale orange-pink medially (darker pink in fresh specimens) and light orange submarginally, lacking the gray and black shading of the forewing apices or the strongly contrasting medial and submarginal areas as in *I. ecuadoriana.* In this way, *I. leva* is somewhat similar to *I. ventana*, but is larger, with smaller hyaline patches, and more subdued markings. The male genitalia are very robust, with well-developed teeth in the valva indentation, and a relatively broad phallus. The female genitalia are more distinctive in this species than those of the male, having a broad lamella postvaginalis that mesally protrudes outward like a bird's beak.

Description. Male. *Head*: As for genus. *Thorax*: As for genus. Forewing length 21–30 mm (mean=27.6 mm), wingspan 48–61 mm (n=24); forewing as for genus but particularly elongate. Dorsum ground color pale pinkish orange, darker orange submarginal area contrasting against lighter antemedial and medial areas. Submarginal area generally without dark suffusion, though if present, very faint, not forming lunule-like shape. Apex may be lightly suffused with gray. Fringe dull orange. Forewing ventrum as for genus, but appearing lighter due to much fewer dark petiolate scales. Hindwing



FIGS. 21–24. Male genitalia of *Isoscella*, a=ventral, b=lateral, c=phallus. **21.** *I. ecuadoriana*, holotype, Ecuador, Napo, Cordillera Guacamayos, 2181 m, genitalia prep. 29.262 [vesica fully everted] (MWM, slide mount photo courtesy of A. Prozorov). **22.** *I. ecuadoriana*, Ecuador, Tungurahua, Baños [Baños de Agua Santa?], 1800 m, St Laurent diss.: 2-26-16:2 [right valve damaged, repaired in CS4, vesica partly everted] (CUIC). **23.** *I. leva*, holotype, Peru, Puno, Carabaya, Santo Domingo, 6000 ft, St Laurent diss.: 5-3-16:2 [vesica partly everted] (NHMUK). **24.** *I. leva*, paratype, Bolivia, Cochabamba, Incachaca, St Laurent diss. 4-29-16:3 [vesica fully everted] (USNM). Scale bar=1mm.

subtriangular, dorsum coloration, markings as for forewing dorsum. Hindwing ventrum with continuation of pattern of forewing ventrum but slightly lighter overall. *Abdomen*: As for genus, concolorous with thorax, slightly darker orange-pink ventrally. Genitalia (Figs 23, 24) (n=7) as for genus but cup-like indentation of valva heavily sclerotized and lined with sharp teeth. Valva elongated, triangular, usually somewhat truncated distally. Phallus cylindrical, slightly broadened distally. **Female.** *Head*: As in male but antennal rami shorter. *Thorax*: As in male. Forewing length 30–34 mm (mean=32 mm), wingspan 61–67 mm (n=3), forewing similar overall to male, but broader, margin slightly convex, apex more sharply pointed. Dorsum ground color as in male but somewhat darker due to black suffusion medially, postmedial line usually darker and broader than in male, particularly well-defined after passing Rs4. Discal cell marked with oblong hyaline patch bisected by M_2 and encircled by black scales. Forewing ventrum similar to dorsum but ground color uniformly lighter orange-yellow, darker petiolate scales more numerous and distinct; antemedial line absent, postmedial line nearly absent with only traces present near



FIGS. 25–28. Male genitalia of *Isoscella*, a=ventral, b=lateral, c=phallus. **25.** *I. peigleri*, holotype, Ecuador, Carchi, road El Chical to Carolinae, 1970 m, genitalia prep. 29.246 [vesica fully everted] (MWM, slide mount photo courtesy of A. Prozorov). **26.** *I. peigleri*, paratype, Ecuador, Carchi, Road El Chical to Carolinae, 1970 m, genitalia prep. 29.245 [vesica partly everted] (MWM, slide mount photo courtesy of A. Prozorov). **27.** *I. peigleri* [putative], Colombia, Tolima, San Antonio, 5800 ft, St Laurent diss.: 4-4-16:2 [vesica partly everted] (NHMUK). **28.** *I. andina*, holotype, Peru, Junín, Cerro Pichita Res. Sta. nr San Ramón, 2165 m, St Laurent diss.: 2-26-16:1 [vesica fully everted] (MWM). Scale bar=1 mm.

tornus and costa. Wing margins darker orange-brown, appearing somewhat singed. Hindwing rounded, dorsum coloration, markings as for forewing dorsum, but antemedial line absent, postmedial line continuously dark to anterior wing margin, hyaline patch smaller, narrower, situated nearer to postmedial line. Hindwing ventrum with continuation of pattern as forewing ventrum but pinker rather than orange. *Abdomen*: Concolorous with thorax, slightly darker orange ventrally. Genitalia (Fig. 31) (n=1) robust; tergite of VIII forms smooth, posteriorly directed arch, arch slightly accentuated mesally. Apophyses anteriores roughly same length as apophyses posteriores, but apophyses posteriores more robust. Lamella antevaginalis reduced, thin, wrinkled. Lamella postvaginalis wide, robust, heavily sclerotized, angled mesally, with mesal angle protruding outwards as truncated beak-like process, each side of lamella postvaginalis broadened, covered in short setae. Ductus bursae short, not clearly differentiated from corpus bursae. Base of papillae anales with robust, sclerotizations dorsolaterally, covered in short, thick setae. Papillae anales box-like, covered in long, fine setae, setae much shorter basally.

Distribution (Fig. 34). This species is distributed from central Peru south to Bolivia where it is found at elevations of 750 to 2500 m. See remarks for a single specimen from Piura, Peru.

Etymology. From Latin levo/levare meaning to make smooth or polish, referring to the smooth patterning dorsally and ventrally, mostly not obfuscated by petiolate scales or black suffusions as in other taxa in the genus. Additionally, the lamella postvaginalis in the female genitalia is remarkably smoothly keeled mesally.

Remarks. *Isoscella leva* has the broadest documented distribution along the Andes Mountains of any taxon in the genus, but is morphologically consistent along this range, particularly externally. However, in specimens from Peru the valva tends to be slightly more truncated distally than in those from farther south in Bolivia.

A single specimen at MWM from Piura, Peru externally matches *I. leva* from central and southern Peru, but considering the fact that this single specimen is from a rather unique location, and very distant from all other known populations of *I. leva*, and our inability to examine the genitalia of this specimen, we decided to omit it from the type series. We are unclear as to whether this species is present in northwest Peru.

Isoscella peigleri, new species

Psychocampa sp. 3; Piñas 2007, fig. 216 (questionable, see remarks)

(Figs 12–14, 18, 25–27, 32, 34)

Holotype, ♂: **ECUADOR: Carchi:** ECUADOR, CARCHI prov., road El Chical - Carolinae, 0°49'49''N/ 78°13'15''W, 16. Nov. 2012; 1970 m, leg. Sinyaev & Romanov, Expedition Ron Brechlin, genitalia prep. 29.246 Museum WITT München / HOLOTYPE ♂ *Isoscella peigleri* St Laurent & Carvalho, 2017 [handwritten red label]/ (MWM).

Paratypes. (8 ♂, 1 ♀ total) **ECUADOR: Carchi:** 2 ♂, Road El Chical to Carolinae, 0°50'20''N, 78°13'39''W, 2360 m: 20.XI.2012, Sinyaev & Romanov leg., Expedition Ron Brechlin (MWM). 6 ♂, Road El Chical to Carolinae, 0°49'49''N, 78°13'15''W, 1970 m: 16.XI.2012, Sinyaev & Romanov leg., Expedition Ron Brechlin, genitalia preps. 29.245, 30.001 (MWM). **Cotopaxi:** 1 ♀, San Francisco de Las Pampas, Otonga, 2600 m: 22.III.1993, Jan Hillman leg., undisturbed cloud forest, St Laurent diss.: 3-14-16:1 (CMNH). – Paratypes with the following yellow label: PARATYPE ♂/♀ *Isoscella peigleri* St Laurent & Carvalho, 2017.

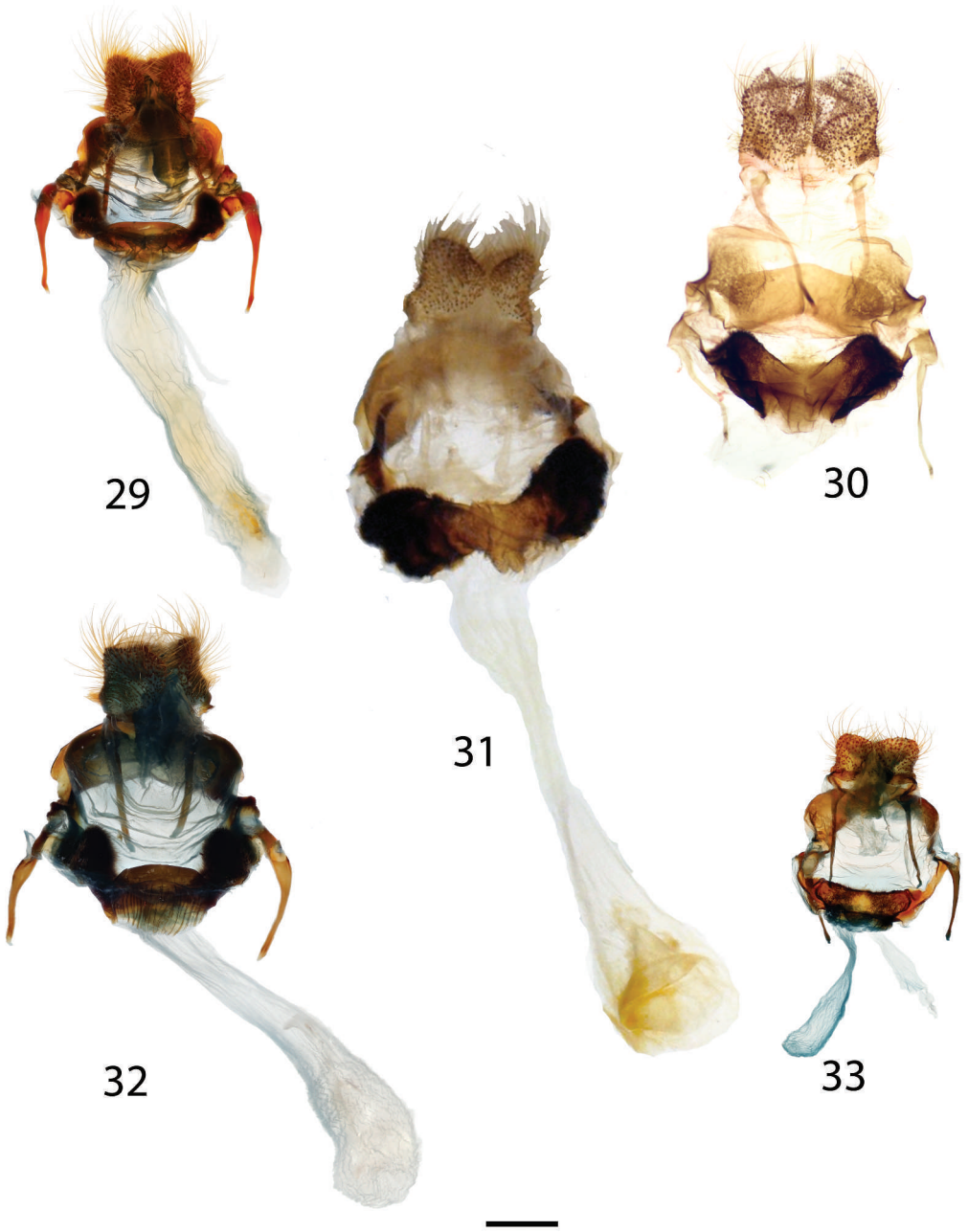
Additional specimens examined. [Not included in type series] **COLOMBIA: Tolima:** 4 ♂, San Antonio, 5800 ft: XI.1907 (1 ♂), XII.1907 (2 ♂), no date (1 ♂), M.G. Palmer leg., Brit. Mus. 1931-471, Joicey Coll Brit. Mus. 1925-157, St Laurent diss.: 4-4-16:2, NHMUK010355075 (NHMUK). **ECUADOR: Imabura:** 1 ♂, Cuellaja, Intag Valley, 0°27'50''N, 78°32'52''W, 2400 m: live specimen photographed by Andreas Kay, not collected (Fig. 18).

Diagnosis. This species, like *I. andina*, sp. n., is darker in coloration compared to all the previous species. The overall wing shape and maculation are most similar to the previous species and can be distinguished from *I. andina*, sp. n. by the more triangular, broader wings and overall larger size. While the maculation is reminiscent of *I. ecuadoriana*, the darker ground color immediately distinguishes this species. The male genitalia are recognizable in having the broadest valvae of the genus, which are distinctly angled upward, not smoothly curving upward as in all other species. Valva indentation teeth are well developed, and the phallus is the broadest in the genus. Female genitalia are essentially indistinguishable from those of *I. ventana*, but are larger.

Description. Male: *Head*: Dark rusty red-brown, interspersed with dark petiolate scales; antenna brown. *Thorax*: Coloration as for head, interspersed with dark petiolate scales, prothoracic collar lined with prominent gray scales. Forewing length 26–38 mm (mean=28.9 mm), wingspan, 52–60 mm (n=8); forewing elongate, triangular, margin nearly straight, concave along falcate apex. Dorsum ground color dark brown with slight purplish hue. Submarginal area darker brown than antemedial and medial areas, black suffusion present submarginally, especially along postmedial line. Overall lightly speckled by dark and bicolored white and black petiolate scales. Antemedial line faint to nearly absent, wavy, black. Postmedial line black, nearly straight from tornus until just before Rs4 where line becomes fainter and angles perpendicularly to costa. Discal cell marked with B-shaped to nearly circular hyaline patch bisected by M_2. Forewing ventrum similar to dorsum but lighter, more homogenously colored, darker petiolate scales more numerous and distinct, especially antemedially and medially; antemedial line absent, postmedial line reduced to wavy traces. Hindwing triangular, dorsum coloration, markings as for forewing dorsum, but antemedial line absent, postmedial line slightly undulated, hyaline patch smaller, situated nearer to postmedial line. Hindwing ventrum with same pattern as forewing ventrum but lighter. *Abdomen*: As for genus, concolorous with thorax, thus darker. Genitalia (Figs 25–27) (n=4) as for genus but valvae more outwardly situated, cup-like indentation of valva lined with heavily sclerotized teeth. Valva triangular, very broad basally, distinctly angled upward (viewed ventrally). Phallus widely broadened distally. **Female:** *Head*: As for male antenna smaller, pectinations shorter. *Thorax*: As for male. Forewing length 35.5 mm, wingspan 70.5 mm (n=1); forewing as for male, but broader, convex mesally, dorsum ground color rusty reddish brown, with black suffusions throughout submarginal area, overall heavily speckled by dark petiolate scales. Antemedial line black, wavy. Postmedial line nearly straight from tornus until reaching Rs4 where line becomes faint and angled perpendicular to costa, dark suffusion follows outer edge of postmedial line from tornus until passing angle at Rs4 giving impression of postmedial line being continuous from tornus to apex, suffusion curves approaching apex; apical quarter of wing slightly darker between postmedial line and costa. Discal cell marked with oblong, somewhat B-shaped hyaline patch bisected by M_2. Fringe somewhat contrasting, dull orange. Forewing ventrum similar to dorsum but lighter, dull pink, darker petiolate scales as numerous and distinct as on dorsum, but basal half of many of these scales white; antemedial line absent, postmedial line faint, vaguely S-shaped. Hindwing rounded, dorsum coloration and markings as for forewing dorsum, but antemedial line absent, postmedial line continuously dark to anterior wing margin, hyaline patch smaller, narrower, situated nearer to postmedial line. Hindwing ventrum follows same pattern as forewing ventrum. *Abdomen*: As for male but more robust. Genitalia (Fig. 32) (n= 1). Robust; tergite of VIII forms smooth, posteriorly directed arch. Apophyses anteriores roughly same length as apophyses posteriores, but thicker proximally. Width of lamella antevaginalis roughly equal to that of papillae anales, robust, concave, wrinkled mesally. Lamella postvaginalis with dark, amorphous masses covered in short, thick setae located on either side. Ductus bursae short, not easily differentiable from long, tubular corpus bursae. Base of papillae anales with robust sclerotizations dorsolaterally, covered in short, thick setae. Papillae anales somewhat box-like, covered in long, fine setae, setae much shorter basally.

Distribution (Fig. 34). *Isoscella peigleri* is found in the western Andes of northwestern Ecuador from 1900 to 2600 m elevation. It may also be present in central Colombia, but see remarks for information regarding this population.

Etymology. *Isoscella peigleri* is named for Richard Peigler, a



FIGS. 29–33. Female genitalia of *Isoscella*, ventral. **29.** *I. ventana*, Colombia, Cundinamarca, Finca San Pablo, 3 km N Albán, 1800 m, St Laurent diss.: 3-7-16:1 (AMNH). **30.** *I. ecuadoriana*, paratype, Ecuador, Napo, 5 km. SE Cosanga, 2240 m, genitalia prep. 29.244 [corpus bursae damaged, absent from preparation] (MWM, slide mount photo courtesy of A. Prozorov). **31.** *I. leva*, paratype, Peru, Puno, Carabaya, Santo Domingo, 6000 ft, St Laurent diss.: 7-7-16:1 [apophyses anteriores are damaged and not shown here, otherwise very similar to those of other *Isoscella* species] (NHMUK). **32.** *I. peigleri*, paratype, Ecuador, Cotopaxi, San Francisco de Las Pampas, Otonga, 2600 m, St Laurent diss. 3-14-16:1 (CMNH). **33.** *I. andina* [putative], Ecuador, Morona Santiago, Road Gualaceo to Plan de Milagro, 2601 m, St Laurent diss.: 4-29-16:1 (MWM). Scale bar=1 mm.

researcher known for his substantial contributions to the study of Saturniidae. He has been incredibly generous and supportive to both of the authors and has shown great enthusiasm for our research.

Remarks. When examining series of *I. peigleri* and *I. ecuadoriana* from Ecuador at the MWM, it became apparent that in addition to being much darker, *I. peigleri* has slightly narrower wings than *I. ecuadoriana.* It is somewhat easy to mistake greasy specimens of *I. ecuadoriana* with *I. peigleri*, but on close examination the ground color is distinctly different between these two. Furthermore, these two species do not seem to be sympatric as *I. peigleri* is only known

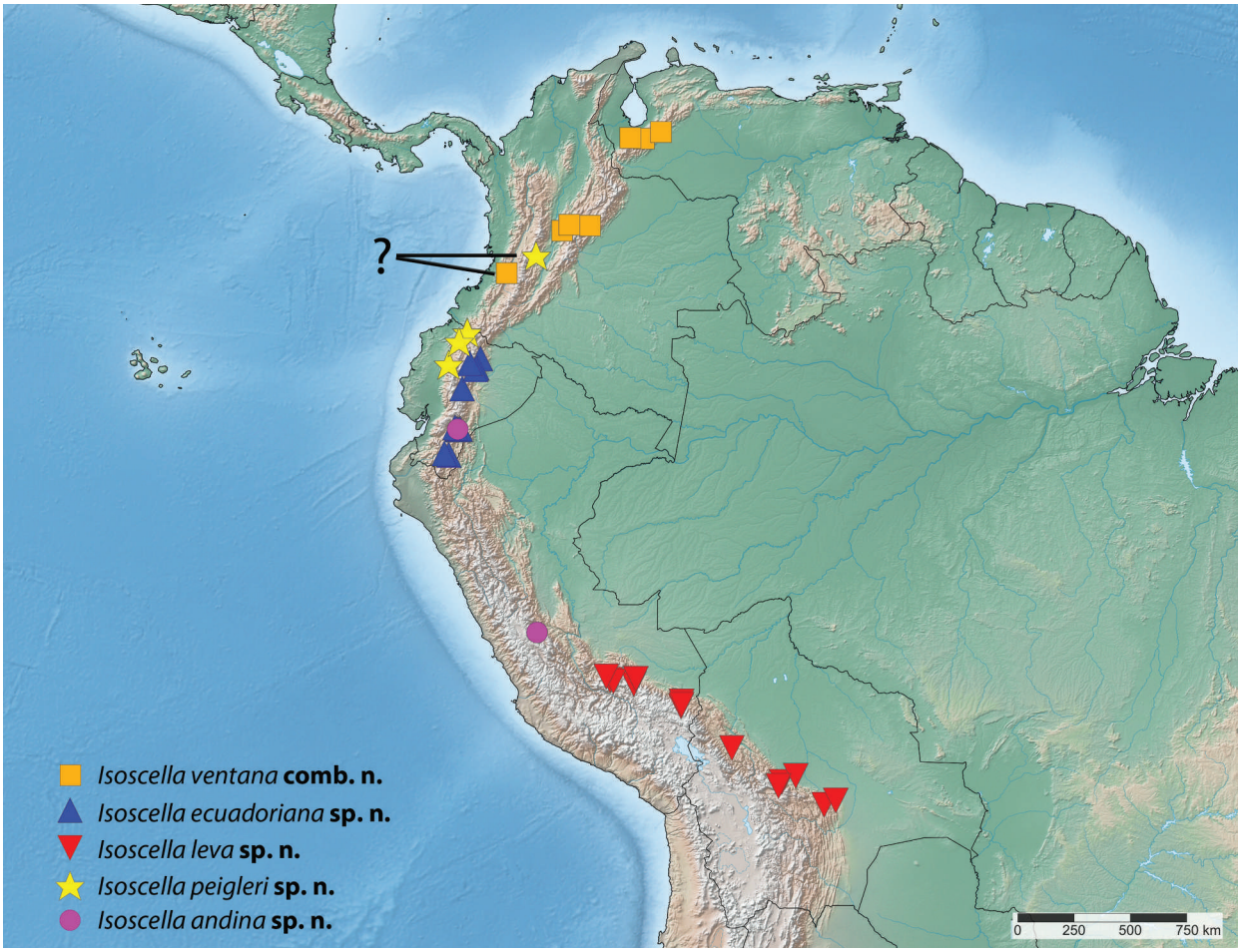


FIG. 34. Known distribution of *Isoscella*. The question mark denotes inconclusively determined *Isoscella* populations.

from the northwestern Andes of Ecuador, while *I. ecuadoriana* is broadly distributed along the eastern Andes from north central to southern Ecuador.

In the NHMUK there are four specimens from Tolima, Colombia, which we have putatively identified as *I. peigleri*. They are dark in color like typical *I. peigleri*, and show the same male genitalia characters, namely the broad, outwardly situated valvae and a distally broadened phallus. However, the Colombian specimens are larger and have broader and more convex wings than any of the examined Ecuadorian material. Therefore, we exclude these specimens from the type series. Additional material from between the type locality of *I. peigleri* and Tolima should help reveal whether these populations are connected and if there is any clinal variation. The previously mentioned variable specimens that we have identified as *I. ventana* from Valle de Cuaca, Colombia, cast further doubt as to the identification of west-central Colombian *Isoscella* populations.

We include the data and a photo (Fig. 18) of a potential specimen of *I. peigleri*. The coloration, northern Ecuadorian locality, as well as elevation are all appropriate for *I. peigleri*, however, the angle at which the living moth holds its wings makes it difficult to accurately determine if the specimen in question is truly *I. peigleri* or an additional undescribed species. We note other similarities besides ground color, such as the bicolored petiolate scales covering the wings, a hyaline patch on each wing (though they are difficult to distinguish in the figure), and postmedial markings, all of which are all highly reminiscent of *I. peigleri*. Despite our uncertainty, we include this figure as it offers a glimpse of the probable natural resting posture of this species, as well as an additional (though expected) provincial record for *I. peigleri*.

Piñas (2007) figures (fig. 219) a dark *Isoscella* specimen. We putatively identify this specimen as *I. peigleri*, but considering the poor quality of the image and the lack of given locality data or genitalia, we are unable to conclusively determine the identity of this specimen.

Isoscella andina, new species

(Figs 15–17, 28, 33, 34)

Holotype. ♂, **PERU: Junín:** Dept. Junin [Junín Region], Cerro Pichita Res. Sta., nr. San Ramon [San Ramón] 2165 m, 7–9 Apr 2011, J.B. Heppner & C. Carrera/ St. Laurent diss.: 2-26-16:1/ HOLOTYPE ♂ *Isoscella andina* St Laurent & Carvalho, 2017 [handwritten red label]/ (MGCL).

Paratype. PERU: Junín: 1 ♂, Same data as holotype (MGCL). Paratype with the following yellow label: PARATYPE ♂ *Isoscella andina* St Laurent & Carvalho, 2017.

Additional specimen examined. [Not included in type series] **ECUADOR: Morona Santiago:** 1 ♀, Road Gualaceo, Plan de Milagro, 3°00'42"S, 78°36'19"W,

2601 m: V. Siniaev & O. Romanov leg., St Laurent diss.: 4-29-16:1 (MWM).

Diagnosis. *Isoscella andina* is easily distinguished from all previously described *Isoscella* by the much smaller size, the red-orange coloration with black suffusions, and the very narrow wings. Additionally, this is the only species in the genus in which the forewing postmedial line is diagonally straight on both the dorsum and ventrum of the wing. The genitalia also distinguish this species. The male genitalia of *I. andina* are recognized by their overall much smaller size, as well as by the shortness of the arm-like processes emanating from the base of the vinculum, which are shorter and broader than in all other congeners, and do not terminate in the cup-like indentation on the valvae as in the other species. The female genitalia are similar in general structure to congeners, but are much smaller, with the lamella postvaginalis being rectangular and not bent or smoothly keeled mesally. *Isoscella andina* also has a smaller corpus bursae and a more deeply concave, wider, bowl-like lamella antevaginalis.

Description. Male. *Head*: As for genus but dark rusty red, grayer ventrally, eyes bordered posteriorly by thin margin of dark scales; antenna dark khaki colored. *Thorax*: Coloration as for head, interspersed with dark petiolate scales, prothoracic collar lined with darker gray scales. Legs concolorous with thorax, but with long, gray vestiture on femur and tibia. Forewing length 21 mm (mean=21 mm), wingspan 42 mm (n=2). Forewing elongate, very narrow, margin nearly straight, apex blunt. Dorsum ground color rusty reddish brown, with black suffusions throughout but especially submarginally near tornus and medially in vicinity of discal cell, overall lightly speckled by dark petiolate scales. Antemedial line as diffuse black suffusion. Postmedial line nearly straight from tornus until reaching Rs4 where line becomes faint and angled perpendicular to costa, dark suffusion follows outer edge of postmedial line from tornus until passing the angle at Rs4 giving impression of postmedial line being continuous from tornus to apex, suffusion curves approaching apex; apical quarter of wing slightly darker between postmedial line and costa. Discal cell marked with circular hyaline patch surrounded by black scales, bisected by M_2. Fringe dull orange. Forewing ventrum similar to dorsum but darker petiolate scales more numerous and distinct; antemedial line absent, postmedial line angled perpendicularly toward costa. Hindwing subtriangular, dorsum coloration, markings, and hyaline patch as for forewing dorsum, but black suffusion situated near anterior postmedial edge of wing, hyaline patch smaller, situated nearer to postmedial line, antemedial line absent. Hindwing ventrum follows same pattern as forewing ventrum but postmedial line less straight. Frenulum present, but reduced. *Abdomen*: As for genus but smaller, less robust overall, coloration continuation of thorax. Genitalia (Fig. 28) (n=1) as for genus but cup-like indentation of valva absent. Valva short, barely reaching beyond base of uncus, somewhat triangular, truncated somewhat apically. Phallus cylindrical. Paired vincular processes short, broad, not reaching valva. **Female.** [Description based on one putative female of *I. andina*] *Head*: As in male but antenna darker brown. *Thorax*: As in male but brighter orange. Legs as in male, but gray vestiture shorter overall. Forewing length 21 mm, wingspan 40 mm (n=1). Forewing as in male but broader, dorsum brighter orange in color, postmedial line more pronounced after angle following Rs4, black suffusion which follows outer edge of postmedial line from tornus until passing angle at Rs4 darker, more pronounced. Discal cell marked with slightly ovoid hyaline patch surrounded by black scales, bisected by M_2. Fringe dull orange. Forewing ventrum similar to dorsum but antemedial line absent, postmedial line slightly more diffuse, smoothly curved toward costa rather than abruptly angled. Hindwing rounded, dorsum coloration, markings, and hyaline patch as for forewing dorsum, but hyaline patch barely smaller, touching postmedial line, antemedial line absent. Hindwing ventrum follows same pattern as forewing ventrum but postmedial line less straight. Frenulum apparently absent. *Abdomen*: Concolorous with thorax, slight golden sheen. Genitalia (Fig. 33) (n=1) with tergite of VIII forming smooth, posteriorly directed arch. Apophyses anteriores roughly same length as apophyses posteriores, but thicker proximally. Width of lamella antevaginalis slightly wider than that of papillae anales, robust, concave, bowl-like, covered in short, thick setae, with lobed protrusion extending toward ostium, ostium somewhat rectangular, wide, nearly spanning width of lamella. Ductus bursae short, narrow, corpus bursae elongated, bag-like. Base of papillae anales with robust sclerotizations dorsolaterally, lightly covered in short, thick setae. Papillae anales somewhat box-like, covered in long, fine setae, setae much shorter basally.

Distribution (Fig. 34). This new species is known only from two locations, the type locality at 2165 m in the Junín region of the Peruvian Andes and from Morona Santiago, Ecuador at 2601 m. See remarks for information regarding the Ecuadorian specimen.

Etymology. This species is named for its Andean distribution.

Remarks. *Isoscella andina* is known from only three specimens, collected at two distant localities; hence, the species appears to be relatively widespread. However, the distance between collection localities of the two male specimens (Peru) and the single female (Ecuador) prevents us from including the female in the type series. We acknowledge the possibility that the Ecuadorian population may represent an additional species, and without a male specimen from near the Ecuadorian locality, we cannot make an absolute determination of the identity of this population.

ACKNOWLEDGEMENTS

We greatly appreciate the assistance of the following individuals who provided access to material or photos of specimens from their respective institutions: John Brown (USNM), Alessandro Giusti (NHMUK), David Grimaldi (AMNH), Brian Harris (USNM), James Hayden (MGCL), Tobias Malm (NHRS), John Rawlins (CMNH), Courtney Richenbacher (AMNH), Harald Sulak (MWM), Andrew Warren (MGCL), Thomas Witt (MWM), and Sergio Andrés Vargas (MPUJ). Daniel Herbin (France) provided photos of *Psychocampa mawaja* genitalia and the holotype of *I. ventana* for comparative purposes. Kyle DeMarr (University of California, Berkeley) kindly provided images and data of material from both UGCA and EMEC. Alexey Prozorov (MWM) photographed and dissected several *Isoscella* specimens. Jason Dombroskie (CUIC) facilitated access to camera equipment, stacking software, specimens pertinent to the present research, and helpful suggestions on the manuscript. John Brown reviewed the manuscript and offered valuable feedback. Andreas Kay and Chris Hamilton (MGCL) permitted the publication of their wonderful photos from Ecuador. The Cornell University College of Agriculture and Life Sciences Alumni Award and Thomas Witt offered financial assistance to R. St Laurent.

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Submitted for publication 27 August 2016; revised and accepted 8 December 2016.