Taxonomic revision of the Andean harvestman genus *Rhaucus* Simon, 1879
(Arachnida, Opiliones, Cosmetidae)

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Abstract

The Andean genus *Rhaucus* Simon 1879 is revised. Five valid species are recognized, including *Rhaucus florezi* sp. nov. The following nomenclatural acts are proposed. At genus level: *Megarhaucus* Mello-Leitão, 1941, *Neorhaucus* Pickard-Cambridge, 1905 and *Pararhaucus* Pickard-Cambridge, 1905 are considered junior subjective synonyms of *Rhaucus*. At species level: *Neorhaucus aurolineatus* Pickard-Cambridge, 1905 is considered a junior subjective synonym of *Rhaucus vulneratus* Simon, 1879; *Rhaucus (Rhaucus) tristis* Sørensen, 1932, *Rhaucus (Rhaucus) muticus* Sørensen, 1932 and *Pararhaucus obscurus* Pickard-Cambridge, 1905 are considered junior subjective synonyms of *Rhaucus quinquelineatus* Simon, 1879 (the latter combination is restored from current combination *Flirtea quinquelineata*); *Flirtea paucimaculata* Roewer, 1963, *Rhaucus (Rhaucus) geographicus* Sørensen, 1932, *Metarhaucus reticulatus* Roewer, 1912 and *Metarhacus fuscus* Pickard-Cambridge, 1905 are considered junior subjective synonyms of *Erginus serripes* Simon, 1879 (that is here combined as *Rhaucus serripes* comb. rest.). *Megarhaucus robustus* Mello-Leitão, 1941 is newly combined as *Rhaucus robustus* (Mello-Leitão, 1941) comb. nov. Distribution maps of the species are provided. The new term multicapitate apophysis (mca) is introduced here for a special type of apophysis on coxa IV of males.

Key words: Laniatores, Gonyleptoidea, Colombia, taxonomy, Andes

Introduction

Cosmetidae C. L. Koch, 1839 constitutes the second most diverse family among Laniatores, with 126 genera and 719 species, and is currently divided into two subfamilies: Cosmetinae (116 gen., 680 spp.) and Discosomaticinae (10 gen., 29 spp.) (Kury 2009, 2013). The paucity and inadequacy of characters proposed by Roewer (1912a) and traditionally used to separate genera in this family (e.g., armature of dorsal scutum, scutal areas and anal operculum; number of tarsal segments of leg I) caused many problems in the understanding of its internal relationships. These problems were further aggravated by the extensive synonymy in the genera of Cosmetidae proposed by Goodnight & Goodnight (1953), who abandoned all character sets used by Roewer except the tarsal segmentation of leg I, which further nudged the situation into the mire.

To remedy this adverse situation and secure a grasp on the diversity in this family, and to achieve a natural composition of their genera, smaller building blocks are needed. The focus on the determination of a phylogenetically meaningful core of species surrounding the type species of each genus, based on a comprehensive evaluation of diverse features, is highly valuable in this endeavor. A recent example of this trimming of species in cosmetid genera is *Flirtea* C. L. Koch, 1839, which has been entirely rediagnosed and recomposed (Kury & García 2016).

The present work is a taxonomic revision of the cosmetid genus *Rhaucus* Simon, 1879. These are robust chocolate-brown to black harvestmen, with conspicuous golden or orange markings on dorsal scutum (Fig. 1). Their bodies and legs are densely covered by coarse granulations and sexual dimorphism is evident in the swollen chelicerae and more heavily armed leg IV of males. Here, a redescription of the type species is given, three species are transferred from other genera to *Rhaucus* and a new species is proposed based on the material reviewed from collections of South America. New diagnostic characteristics are given for the genus.
Historical background. The genus *Rhaucus* was originally described to accommodate two new species: *Rhaucus vulneratus* Simon, 1879 and *Rhaucus quinquelineatus* Simon, 1879, with no drawings and type locality given only as “Brazil”, without further locality data. The criteria used by Simon to separate the species of *Rhaucus* from *Erginus* Simon, 1879, *Vonones* Simon, 1879 and *Libitia* Simon, 1879 were the quantity of tarsomeres in the leg I and the tuberculation of dorsal scutum (Simon 1879). Later, Pickard-Cambridge (1905) designated *Rhaucus vulneratus* as the type species of *Rhaucus* and proposed three other monotypic genera, all from Colombia: *Metarhaucus* Pickard-Cambridge, 1905, *Neoarhacus* Pickard-Cambridge, 1905 and *Pararhaucus* Pickard-Cambridge, 1905, with 6, 5 and 7 tarsomeres in leg I, respectively. Additionally, he noted that all of them were related to *Erginus*, a genus distributed in Colombia, Brazil and Ecuador.

Afterwards, two works of Roewer (1912a, 1923) marked a turning point for the taxonomy of genera of Cosmetidae, including *Rhaucus*. He differentiated *Erginus*, *Erginulus* Roewer, 1912, *E. vibratilis*, Roewer, 1912, *Flirtea* and *Rhaucus* from other genera based on leg I exhibiting 6 tarsomeres and legs III and IV having thick basal podomeres. Additionally, he separated *Flirtea* from *Rhaucus* based on the size and height of tubercles in the dorsal scutum. Consequently, he decided to transfer *Rhaucus quinquelineatus* to *Flirtea* and *Erginus mexicanus* Banks, 1898 to *Rhaucus*.


Subsequently, Mello-Leitão (1933) discussed the work of Henriksen (1932) and considered the degree of opening and the shape of ozopores, the ornamentation and length of pedipalpi, the arrangement of eyes, and the thickness of legs as characters to recognize some families and genera in Laniatores. With respect to *Rhaucus*, he established that only the type species belonged to the genus and transferred many of the species included by Henriksen (1932) in *Rhaucus* as follows: *R. vittatus* to *Paecilaeana* Koch, 1839; *R. alpha*, *R. fuscus*, *R. muticus*, *R. geographicus*, *R. limbatis*, *R. reticulatus*, *R. tristis* and *R. tuberculatus* to *Flirtea*; *R. trilineatus* to *Metarhaucus*; *R. obscursus*, *R. simonis*, and *R. togatus* to *Megeterinus* Pickard-Cambridge, 1905. Additionally, eight years later Mello-Leitão (1941) erected the monotypic genus *Megarhacns* Mello-Leitão, 1941 with the species *Megarhacns robustus* Mello-Leitão 1941 from Colombia, being one more of the generic names based on *Rhaucus*.

Later, Goodnight & Goodnight (1953) in one of the most heavily criticized works in Opilionidae, synonymized 64 genera of Cosmetidae into three: *Cynorta* Koch, 1839 (where *Rhaucus* was included), *Paecilaeana* Koch, 1839 and *Vonones* Simon, 1879. Finally, Kury (2003) did not follow the extensive synonymy proposed by Goodnight & Goodnight (1953) and revalidated *Rhaucus* with its type species *R. vulneratus*, and restricted their habitat to the páramos (particular highland ecosystems) from Colombia. Additionally, he considered the characters used by Roewer (1912a) and Mello-Leitão (1933) to transfer the remaining *Rhaucus* species of Henriksen (1932) to *Meterginus*. Thus, at present, *Rhaucus* is considered monotypic and an ethological paper (Rojas et al. 2011) and some photographs of living specimens (Sharma & Giribet 2011: 107) have recently been published.
Materials and methods

A total of 175 individuals (101 females, 73 males and 1 juvenile) in 65 lots were revised. Individuals of each species were photographed using a Sony Cybershot DSC-V1 camera. The multiple resulting images at different focal planes were combined with Combine ZP Suite software (http://www.hadleyweb.pwp.blueyonder.co.uk/) to increase the depth of field and were posteriorly edited in Photoshop CC 2014 software. Drawings of the species were made using Inkscape 0.91 software. The types of Pickard-Cambridge were imaged in the Sackler Biodiversity Imaging Laboratory of the British Museum of Natural History (BMNH) using their image capture system.

Color descriptions use the standard names of the 267 Color Centroids of the NBS/IBCC Color System (http://people.csail.mit.edu/jaffer/Color/Dictionaries#nbs-iscc) as explained in Kury (2012). Scanning Electron Microscopy (SEM) was carried out with a JEOL JSM-6390LV at the Center for Scanning Electron Microscopy of Museu Nacional/UFRJ with accelerating voltage of 10 kV after sputter-coating with gold-palladium.

Geographic coordinates have been transcribed verbatim from the labels and may be in different formats; when there was no indication of coordinates, they were interpolated between square brackets in sexagesimal degrees without specification of seconds to indicate that they are estimates, using the Agustin Codazzi Institute Geoportal (http://geoportal.igac.gov.co). The distribution maps were made with Quantum GIS 2.2.0 software. Colored shapefiles refer to WWF Terrestrial Eco-regions of the World (Olson et al. 2001).


Morphometric abbreviations are: AL = maximum abdominal scutum length; AW = maximum abdominal scutum width; BaCh = basichelicerite length; ci = clavi inguines; CL = carapace length; CW = maximum carapace width; dap = dorsal-anterior processes from coxae I–II; dpp = dorsal-posterior processes from coxae I–II; DS = Dorsal Scutum; Fe = femur; FeL = Femur length; mca = multicapitate apophysis; MS = macrosetae of penis; ms = microsetae of penis; Ti = tibia; TiL = Tibia length; VP = ventral plate. All measurements are in mm, unless otherwise noted.

Abbreviations of the cited repositories are: BMNH (The Natural History Museum, London, United Kingdom), CBUP-I (Colección Biológica Universidad de Pamplona–Invertebrados, Pamplona, Colombia), ERPC (Eduard Reimoser Personal Collection, Vienna, Austria), IAvH (Instituto Alexander von Humboldt, Villa de Leyva, Colombia), ICN-AO (Instituto de Ciencias Naturales de la Universidad Nacional de Colombia – Arachnida Opiliones, Bogotá, Colombia), MHNN (Muséum d’Histoire Naturelle, Neuchâtel, Switzerland), MNHN (Muséum National d’Histoire Naturelle, Paris, France), MNRJ (Museu Nacional da Universidade Federal do Rio de Janeiro, Rio de Janeiro, Brazil), NHMB (Naturhistorisches Museum, Basel, Switzerland), NHMW (Naturhistorisches Museum Wien, Vienna, Austria), SMF (Forschungsinstitut und Naturmuseum Senckenberg, Frankfurt am Main, Germany), ZMUC (Zoological Museum, University of Copenhagen, Copenhagen, Denmark).

Systematic results

Cosmetidae C. L. Koch, 1839

Rhaucus Simon, 1879


*Cynorta* [part.]: Goodnight & Goodnight, 1953: 37.


*Pararhaucus* Pickard-Cambridge, 1905: 572; Roewer, 1912a: 101; Roewer, 1912b: 142; Roewer, 1923: 378; Mello-Leitão, 1926: 335; Roewer, 1928: 551; Mello-Leitão, 1932: 88; Mello-Leitão, 1933: 107; Mello-Leitão, 1935: 114 [junior subjective synonym of *Paecilaema* C. L. Koch, 1839 by Goodnight & Goodnight (1953b: 54)]. **New synonymy**
Etymology. From Greek Ῥαύκος (name of two cities in Crete). Gender masculine.


Diagnosis. DS alpha type (in Cynorta, Eulibitia and Flirtea beta type), tegument granular (Figs 3a, 10a) (in Eulibitia, Flirtea and Metarhaucus smooth). Mesosterna widely divided into four areas by well-marked grooves. Area III with a pair of tubercles varying between acuminate, dome-shaped or mammilliform (Figs 6c, 12c, 15c) (in Cynorta and Flirtea acuminate medium/high spines; in Eulibitia, very short tubercles). Pedipalpal tibiae wide, spoon shaped (Figs 4b, 8b) (in Cynorta, Erginus, Eulibitia and Flirtea elongated, in Roquettea spatulate). Coxae IV with prominent multi-tuberculated clavi inguinales (Figs 4h–i) (in Cynorta and Flirtea one large apophysis, in Eulibitia two irregular tubercles, in Taito wrinkled granules) and a multicapitate apophysis (mca) at least seven tubercles (Fig. 4i) (in Cynorta three fused tubercles, in Taito two tubercles, in Platymessa two fused tubercles). Legs III–IV curved, robust and very granular, with a pair of ventral rows of spines from Fe to Ti (Figs 3d–e, 7d–e) (in Cynorta, Erginus, Eulibitia and Flirtea straight, thin and mostly smooth). Femur IV shorter than DS length (longer in Cynorta, Erginus, Eulibitia and Flirtea). VP of penis short (in Flirtea very elongated), with two lateral patches of type 4 microsetae not reaching the center of the VP in ventral view (Figs 5c, 8h) (in Cynorta covering the entire surface, in Eulibitia covering only lateral margins, in Flirtea smooth). VP of penis with two large MS A (Figs 5b, 11g, 14i) (in Cynorta one MS A extremely reduced, in Flirtea one MS A larger).

Included species. Rhaucus vulneratus Simon, 1879; Rhaucus quinquelineatus Simon, 1879 comb. rest.; Rhaucus serripes (Simon, 1879) comb. rest.; Rhaucus robustus (Mello-Leitão, 1941) comb. nov.; Rhaucus florezi sp. nov.

Geographical distribution and habitat. Kury (2003) correctly stated that Rhaucus inhabits Andean highlands in Colombia, near Bogotá (and not Brazilian Amazon), but also gave an isolated record from Monterredondo (Cauca, 1400 m a.s.l.). This record is probably a mistake and should refer to Monterredondo, a locality in the road from Bogotá to Chingaza National Natural Park (Fig. 21b) very close to where R. robustus, R. quinquelineatus, and R. vulneratus have been collected. Ranges of species of Rhaucus show a significant degree of overlap (Figs 22, 23). They seem to be endemic to the Northern Andes in Colombia, from areas of Santander, Boyacá and Cundinamarca over 2300 m a.s.l. where montane forests and páramos from the Eastern mountain chain are dominant.

Key to the males of species of Rhaucus

1. DS with transverse yellow stripes (dissociated in a few specimens) (Figs 1a, 6a, 15a); area III tubercles acuminate or mammilliform (Figs 6c, 15c) ........................................................... 2
   DS without transverse yellow stripes (Figs 9a, 12a); area III tubercles domed (Figs 9c, 12c) ........................................ 4
2. Area III with a pair of acuminate tubercles pointed backwards (Figs 6d–e); ventral row of tubercles in legs III and IV weakly developed, increasing in size distally (Figs 7d–e); dorsal process of glans penis spoon-shaped (Fig. 8f) ............................................................... Rhaucus quinquelineatus Simon, 1879 comb. rest.
   Area III with a pair of mammilliform tubercles (Figs 2c, 15c); ventral row of tubercles in legs III and IV strongly developed, same size along the entire length (Figs 3d–e, 16d–e); dorsal process of glans penis fin-like or finger-like ................................. 3
3. DS with five orange transverse stripes (Fig. 1a); prolateral row of tubercles in legs III and IV weakly developed (Figs 3d–e); finger-like process of penis slender (Fig. 5d) ............................................ Rhaucus vulneratus Simon, 1879
   DS with five yellow transverse stripes (Fig. 15a); prolateral row of tubercles in legs III and IV strongly developed (16d–e); finger-like process of penis rounded, elongated (Fig. 17f) ........................................ Rhaucus florezi sp. nov.
4. DS with island-blots pattern (Fig. 9a), profusely covered with granules (Fig. 10a); finger-like process of penis narrow (Fig. 11f) ................................................................. Rhaucus serripes (Simon, 1879) comb. rest.
   DS with reticulated pattern (Fig. 12a), scarcely covered with granules (Fig. 13a); finger-like process of penis acuminate, elongated (Fig. 14g) .................................................. Rhaucus robustus (Mello-Leitão, 1941) comb. nov.
**Rhaucus vulneratus** Simon, 1879  
(Figs 1a–b, 2–5, 18a, 19a–b, 22)

*Rhaucus (Rhaucus) vulneratus*: Sørensen, 1932: 355.  
*Neorhaucus aurolineatus* Pickard-Cambridge, 1905: 572; Roewer, 1912a: 25; Roewer, 1923: 305; Kury, 2003: 74. **New synonymy**

**Type material.** ♀♂ syntypes of *Rhaucus vulneratus* (MNHN, examined by photograph); ♂ holotype of *Neorhaucus aurolineatus* (BMNH 1891.8.1.958–959 Coll. Keyserling, examined).

**Distribution and habitat.** COLOMBIA, Boyacá Department: Toca. Cundinamarca Department: Bogotá, La Calera, Mosquera, San Antonio del Tequendama, Subachoque, Zipaquirá. Between 2300 and 3600 m a.s.l., especially in the Northern Andean páramo ecoregion (Figs 22, 24b).

**Diagnosis.** Five orange transverse stripes on DS (sometimes divided or rarely absent, contrasting with all other species of *Rhaucus*), the anterior one V-shaped and delimiting the anterior border of area I (Figs 2a, 18a); a pair of short tubercles in area III (Figs 2c–d; contrasting with taller tubercles in all other species of *Rhaucus*); prolateral row of tubercles of same size in legs III and IV weakly developed (Figs 3d–e) (increasing in size distally in *R. quinquelineatus*, strongly developed in *R. florezi* sp. nov.).

**Redescription.** Male (ICN-AO-437)

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<th>Species</th>
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<td><em>Rhaucus vulneratus</em></td>
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<td><em>Rhaucus quinquelineatus</em></td>
<td>7</td>
<td>2.0–2.3</td>
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<tr>
<td><em>Rhaucus serripes</em></td>
<td>7</td>
<td>2.0–2.1</td>
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<tr>
<td><em>Rhaucus robustus</em></td>
<td>3</td>
<td>2.0–2.3</td>
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<tr>
<td><em>Rhaucus florezi</em></td>
<td>4</td>
<td>2.1–2.2</td>
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a pair of paramedian, mammilliform, medium-sized tubercles (Figs 2c–d, 3a–b). Posterior border of scutum sub-straight and with a row of tubercles. Free tergites I-III with a row of granules (Figs 2a, 2d, 3a–b).

**Venter** (Figs 2b, 4h): Stigmatic area with a few granules. Stigmata large, oval and transverse. Coxa I with two parallel rows of tubercles increasing in size distally and with an anterior smooth space for the pedipalps to rest (Fig. 4h); coxa II longer than coxa I, granulate; coxa III longer than I and II, granulate, with posterior margin sigmoid; coxa IV strongly backward, granulate (Fig. 2b). Genital operculum slightly granulate.

**Pedipalps** (Figs 4a–d): Coxa with one meso-distal granule dorsally and ventrally. Trochanter with one dorsal short tubercle and two ventral tubercles fused at base (mesal tubercle taller); femur compressed, dorsally with a row of aligned triangular setiferous tubercles of different sizes –not reaching the distal portion-, ventrally with three basal, fused large setiferous tubercles, three individual conical large setiferous tubercles, two partially fused large setiferous tubercles, and two small tubercles. Patella distally depressed, with dorsal granules; tibia depressed, spoon-shaped, dorsally granulate, with lateral borders tuberculate and some spiniferous tubercles at distal portion (Figs 4a–b); inner surface slightly striated (Fig. 4c). Tarsus long, conical, with some dorsal granules and ventrally with two rows of thickened setae (Fig. 4d).

**Chelicera** (Figs 2, 4e–f): Chelicera swollen. Basicelicerite rectangular, with dispersed granules, one group of tubercles of different sizes on the proximal border, one large ecto-distal tubercle, and one medium-sized, meso-distal tubercle. Hand with one tubercle near the joint of the movable finger. Fixed finger with the inner surface finely grooved. Movable finger with one conical, sub-basal tooth and with the inner surface at distal portion dentate (Fig. 4f).

**Legs** (Figs 2a–b, 3c–e, 4g–i): Coxae I–II each with an irregular dorsal anterior and dorsal posterior process (Fig. 4g); coxa III with one sub-distal retrolateral granule; coxa IV coarsely granulate (Figs 2a, 3a, 4h), with a prominent anterolateral clavi inguines (ci) and a posterolateral multicapitate apophysis (mca) (Fig. 4i). Trochanter I–II dorsally with some minute granules and ventrally with some tubercles; trochanter III with one prodorsal tubercle and one retrolateral robust tubercle; and ventrally with a few lateral granules; trochanter IV with one group of prodorsal granules and one group of retrolateral granules (one of them larger and ventrally projected) (Figs 3d–e). Femora I–IV sigmoid, granulated; III–IV ventrally with two longitudinal sigmoid rows of conical tubercles all along its length, of different sizes, and one prolateral and one retrolateral row of tubercles (dorsally evident) (Figs 3d–e). Patellae I–IV dorsally granulate, curved; patella IV with some distal retrolateral granules (Fig. 3e). Tibiae I–IV granulate; tibiae III–IV sigmoid, with two longitudinal sigmoid rows of conical tubercles of same size all along its length (the distal-most tubercle of tibia III fused, visible in retrolateral view) (Fig. 3d), tibia IV the same, slightly more granulate than tibia III (Fig. 3e). Metatarsus I–IV with one ventrodorsal seta. Tarsi I–II with one smooth claw; tarsi III–IV with 2 subparallel smooth claws and tarsal process (Fig. 3c). Tarsal counts: 6(3)–6(3)/12(3)–12(3)/9–?/10–9. Intraspecific variations in Table 2.

**Color** (in ethanol): Carapace Dark Brown (59), reticulated in the ocularium. Lateral and posterior border of dorsal scutum and free tergites Deep Brown (56). Transverse lines of carapace Vivid Orange (48). Pedipalps, coxae I–IV, chelicera and trochanters Strong Brown (55), reticulated. Legs I–IV Strong Reddish Brown (40). This species has the darkest carapace, more evident in living specimens (Figs 1a–b).

**Male genitalia** (Figs 5a–e): VP of penis subrectangular with concave distal border; VP with two lateral, elongated, dense patches of type 4 microsetae, separated by a narrow longitudinal space (Figs 5c, 5e). VP with two apical MS C curved and laterally inserted; two MS D, the most distal (D1) large and straight following the same lateral row as MS C, and the other (D2) smaller, inserted dorso-laterally on the middle third of VP (Fig. 5a); two MS A straight and laterally inserted, near to D2 (Fig. 4b); two small MS E volcano-shaped on the ventral face (Fig. 5e); one small MS B volcano-shaped inserted laterally at the base of the VP (Fig. 5c). Glans mostly smooth; stylus long, falciform, papillae-like wattle barbels, finger-like dorsal process slender (Fig. 5d). **Remarks:** Fig. 5a shows three MS A in one individual, while Fig. 5b shows two MS A in one side and one MS A in the other side of ventral plate of another individual. The predominant condition in other specimens of *R. vulneratus* and other species of *Rhaucus* is the presence of only two MS A.

**Female.** Similar to male, but differs by having anterior part of carapace narrower and coda divergent, ocularium lower, abdominal scutum more strongly convex, free tergites and posterior area of scutum wider, tubercles of area III shorter, legs III–IV and associated rows of tubercles thinner, and chelicerae not hyperthelic (Figs 2d–e). **Female genitalia** (Figs 5f–g): Ovipositor with 10 straight peripheral setae (curved at top), striated (Fig. 5f), divided in four rounded lobes (collapsed in photographs), the two anterior ones with more setae than posterior. Tip of setae irregular; tridentate (Fig. 5g).
FIGURE 1. Photographs of live males of Rhaucus. a–b. Rhaucus vulneratus: a. Showing the five transverse orange lines on DS, b. Morph without transverse lines on DS, c. Rhaucus robustus, d. Rhaucus quinquelineatus, e. Rhaucus florezi sp. nov., f. Rhaucus serripes. [Photographs by A. García (a, b, d) and courtesy of John Uribe (c) and Miguel Medrano (e–f)].
FIGURE 4. *Rhaucus vulneratus* SEM (ICN-AO-437). Male: a–d, pedipalp: a. Ectal view, b. Mesal view, c. Detail of tibia, dorso-mesal view, d. Tarsus. e–f, chelicera: e. Basichelicerite, dorso-mesal view, f. Fingers, ectal view. Body: g. Ozopore (Oz), dorsal-anterior (dap) and dorsal-posterior (dpp) processes from coxae I–II, lateral view, h. Coxae I–IV, ventral view (arrow indicates pedipalpal ditch; rectangle indicates extension of detail in Figure 4i), i. Detail of Figure 4h showing clavi inguines (ci) and coxa IV multicapitate apophysis (mca).
FIGURE 5. SEM of genitalia of Rhaucus vulneratus (ICN-AO-437): a–e, penis of two male specimens: a. Lateral view, showing the A–E macrosetae, b. Dorsal view, also showing asymmetry of MS A, c. Ventral view, d. Stylus and thumb-like process (indicated by arrow), lateral view, e. Detail of MS E and microsetae of VP. f–g, ovipositor: f. Latero-apical view, g. Tip of seta.
TABLE 2. Frequency of individuals according to number of tarsomeres from legs I to IV of all species of Rhaucus. Note that different species can share the same quantity of tarsomeres.

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Other material examined. 43 specimens (15 males, 28 females) in 13 lots. COLOMBIA: Cundinamarca Department: Bogotá, 1♀ (ICN-AO-67), Páramo de Chisacá [4°22′N; 74°10′W], ii.1976, O. Castaño & P. Ureña leg.; 1♂ 2♀♀ (ICN-AO-238), Páramo Cruz Verde [4°34′N 74°1′W], 2600 m, v.2010, E. Florez & C. Mattoni leg.; 5♂ 1♀ (ICN-AO-437), Usme Vereda Corinto, Cerro Redondo, Páramo Parada del Viento [4°25′N 74°7′W], 3100 m, 17.v.2008, I. Morales leg.; 1♀ (ICN-AO-495), Usme, Páramo de Chisacá [4°17′N 74°12′W], 3600 m, 28.ii.1976, I. de Arevalo & R. Restrepo leg.; Mosquera, 1♂ 9♀♀ (ICN-AO-199), Desierto de Sabrinsky [4°40′50.33″N 74°14′57.74″W], 2600 m, 2.v.2002, C. Niño, J. Martínez & G. Mora leg.; 1♀ (ICN-AO-1020), Mondoñedo [4°40′N 74°14′W], 2600 m, 23.iii.2009, C. Cantor leg.; 1♂ 2♀♀ (ICN-AO-1034), Desierto de Sabrinzky, [4°40′N 74°14′W], 2650 m, 6.v.2012, D. Triana & S. Galvis leg.; 1♂ 1♀ (MNRJ 9098), same data as ICN-AO-1034; 2♂ 1♀ (ICN-AO-1403), Sabrinsky [4.674983 -74.260131], 10.i.2014, J. Guerrero leg.; La Calera, 1♀ (ICN-AO-482), E.A.A.B. Club La Aguadora - Embalse de San Rafael [4°42′N 74°0′W], 2700 m, ix.2000, P. Barriga & D. Tobar leg.; Subachoque, 7♀♀ (ICN-AO-990), Páramo El Tablazo [5°1′N 74°10′W], 3200 m, 9.ii.2012, J. Martínez leg.; Zipaquirá, 2♂ 1♀ (ICN-AO-1197), Vereda Ventalarga, Represa Pantanoredondo [05°2′N 74°2′W], 3000 m, 27.iv.2003, E. Florez & UN biology students leg.; San Antonio del Tequendama, 1♂ (ICN-AO-1397), Los Tunos Natural Reserve [4°33′47.48″N 74°18′55.69″W], 2300 m, 28.v.2012, W. Galvis leg. Boyacá Department: Toca, 1♂ (ICN-AO-1183), Vereda La Chorrera [05°33′N 73°6′W], 20.xii.2012, D. Triana leg.

Rhaucus quinquelineatus Simon 1879 comb. rest.  
(Figs 1d, 6–8, 20a, 22)

Rhaucus (Rhaucus) quinquelineatus: Sørensen in Henriksen, 1932: 358.  
Metarhaucus albilineatus Roewer, 1912a: 147, pl. 7, figs 5–6; Flórez & Sánchez, 1995: 368. Synonymy established by Roewer, 1912b.  
Paecilaema obscurum: Goodnight & Goodnight, 1953: 54 [by implication].  
Rhaucus (Rhaucus) muticus Sørensen, 1932: 360. New synonymy.  
Flirtea mutica: Mello-Leitão, 1933: 110 [by implication].  
Rhaucus (Rhaucus) tristis Sørensen, 1932: 363, fig. 26. New synonymy.  
Flirtea tristis: Mello-Leitão: 110 [by implication].

Type material. Types of Rhaucus quinquelineatus: ♂♀ syntypes, MNHN, examined by photograph. Holotype of Metarhaucus albilineatus, MHNN, lost. Holotype ♂ of Pararhaucus obscurus, BMNH, examined. Holotype ♀ of Rhaucus muticus, NHMW 1873.1.31.28 (currently 3078), examined by photograph. Types of Rhaucus tristis, 3♀ syntypes, ZMUC, BMNH, examined by photograph.


Diagnosis. A pair of acuminate tubercles in area III, tilted backwards (Figs 6c–e, contrasting with all other species of Rhaucus). Differs from R. florezi sp. nov. by the weakly developed tuberculation of legs III–IV (Figs 7d–e).

Redescription. Male (ICN-AO-465)

Measurements: CL=2.2, CW=3, AL=3, AW=4, BaCh=0.7, FeL III=4.6, FeL IV=6, TiL III=3, TiL IV=4. Intraspecific variation of body and appendages measurements in Table 1.

Dorsum (Figs 1d, 6a, 6c–e, 7a–b, 18b): Dorsal scutum alpha type, granulate (Figs 6a, 7a), with five yellow transverse irregular lines that vary in length and shape, and a reticulate pattern on each side of ocularium (Figs 6a, 7a, 18b). Abdominal scutum widest at level of groove II; areas I–IV granulate. Carapace without conspicuous ornamentation on the anterolateral region (Figs 6a, 7a). Ocularium low without median depression, armed with a cluster of granules (Figs 6a, 6c–e, 7a). Lateral margins of DS with a few granules on the medial region (Figs 7a–b). Mesotergum faintly delimited, divided into four areas: area I with a pair of medium-sized paramedian tubercles; area II with a pair of small paramedian tubercles; area III with a pair of paramedian, conical, acuminate tubercles;
pointing backwards; area IV with a pair of small paramedian tubercles (Fig. 7a). Posterior border of scutum curved and with a row of tubercles. Free tergites I–III with a row of granules (Figs 6a, 7a–b).

Venter (Fig. 6b): Stigmatic area with a few granules. Stigmata large, oval and transverse. Coxa I with two parallel rows of tubercles increasing size distally and with an anterior smooth space for the pedipalp to rest; coxa II longer than coxa I, granulate; coxa III longer than I and II, granulate, with posterior margin sigmoid; coxa IV strongly backward, granulate. Genital operculum finely granulate.


Pedipalps (Figs 8a–c): Coxa dorsally and ventrally with one meso-distal granule. Trochanter with one dorsal short tubercle and two ventral tubercles fused at base (mesal taller); femur compressed, dorsally with a row of aligned triangular setiferous tubercles of different sizes –not reaching the distal portion– and ventrally the same (the three most-basal tubercles fused, the fourth and the sixth tubercles smaller than the others, and the two most-distal tubercles very small). Patella distally depressed with dorsal granules; tibia depressed, spoon-shaped, dorsally
granulate, with lateral borders tuberculate and some setiferous tubercles at distal portion (Figs 8a–b). Tarsus long, conical, with some dorsal granules and ventrally with two rows of thickened setae (Fig. 8c).

Chelicera (Figs 6a–b, 8d–e): Chelicera swollen. Basichelicerite rectangular, with a few granules, the proximal border with two ectal tubercles and two small dorsal granules, the ectal face with two sub-distal joined tubercles, and the mesal face with one large distal tubercle (Figs 6a, 8d). Hand with one tubercle near the joint of the movable finger. Fixed finger with the inner surface finely grooved. Movable finger with one conical, sub-basal tooth and with the inner surface at distal portion dentate (Fig. 8e).


Legs (Figs 6a–b, 7d–e): Coxae I–II dorsally with one posterior process (Figs 6a–b); coxa III with one proximal retrolateral tubercle; coxa IV coarsely granulate (Figs 6b, 7a), with a prominent anterolateral *clavi inguines* and
with a posterolateral multicapitate apophysis (Fig. 6c). Trochanter I–II dorsally with some minute granules and ventrally with some tubercles; trochanter III with some dorsal tubercles and one proximal prolateral tubercle, ventrally with a few granules; trochanter IV with a few dorsal tubercles and one small ventral prolateral tubercle (Figs 7d–e). Patellae I–IV dorsally granulated, curved. Tibiae I–IV sub-straight, with two longitudinal rows of tubercles all along its length, increasing in size distally, and one prolateral and one retrolateral row of tubercles (dorsally just the two last ones evident, the last one curved, thinner and with irregular tip) (Figs 7d–e). Metatarsus I–IV with one ventrodorsal seta. Tarsi I–II with one smooth claw; tarsi III–IV with 2 subparallel smooth claws and a tarsal process (Fig. 7c). Tarsal counts: 6(3)–6(3)/19(3)–19(3)/8–8/9–10. Intraspecific variations in Table 2.


Male genitalia (Fig. 8f–h): VP of penis subrectangular with concave distal border; VP with two lateral, elongated, dense patches of type 4 microsetae, slightly separated in the median longitudinal field, where type 1 microsetae appear (Fig. 8h). VP with two apical MS C curved and laterally inserted; two MS D, the most distal large and straight following the same lateral row as MS C and the other (D2) smaller, inserted dorso-laterally on the middle third of VP; two MS A straight and laterally inserted, near D2 (Fig. 8g); two small MS E volcano-shaped on the ventral face; one small MS B volcano-shaped inserted laterally at the base of the VP (Fig. 8h). Glans mostly smooth; stylus long falciform, papillae-like wattle barbels, spoon-shaped process (Fig. 8f). Remarks. Fig. 8h shows both MS B located inside symmetrical elliptical pits, which, however, are not present in all individuals examined.

Female. Similar to male, but differs by having anterior part of carapace narrower and coda divergent; tubercles of areas I–III shorter; ocularium lower; legs III–IV and associated rows of thinner tubercles; chelicerae not hyperthelic (Figs 6d–e).


Rhaucus serripes (Simon, 1879) comb. rest.
(Figs 1f, 9–11, 18c, 23)

Erginus serripes Simon, 1879: 204.
Rhaucus (Erginus) serripes: Henriksen in Sørensen, 1932: 352.
Erginusfuscus: Roewer, 1912a: 68.
Erginus reticulatus: Roewer, 1912a: 68.
Rhaucus (Rhaucus) geographicus Sørensen, 1932: 369. New synonymy


Type material. Holotype ♂ of Erginus serripes: MNHN, dry pinned, examined by photograph. Holotype ♂ of Metarhaucus fuscus: BMNH, examined by photograph. Types of Metarhaucus reticulatus: MHNN; SMF RI 299; ♀♂ syntypes, ERPC; 3♀ “paratypes” NHMB 63a, examined by photograph. Types of Rhaucus geographicus: 1♂ 3♀ syntypes, ZMUC, BMNH, examined by photograph. Types of Flirtea paucimaculata: holotype ♂, examined by photograph, 4♂ 3♀ paratypes SMF 12710; 1♂ 1♀ paratypes SMF 12716.

**Diagnosis.** Differs from the other species of *Rhaucus* by having DS with *island-blots* pattern (Figs 9a, 10a); DS profusely covered with granules, including tubercles of area III (Fig. 10a), contrasting with smoother tubercles in all other species of *Rhaucus*.

**Redescription.** Male (ICN-AO-1376).

**Measurements:** CL=2, CW=4.2, AL=4, AW=5.2, BaCh=0.5, FeL III=6, FeL IV=8, TiL III=4.2, TiL IV=4.6. Intraspecific variation of body and appendages measurements in Table 1.

**Dorsum** (Figs 1f, 9, 10a–b, 18c): Dorsal scutum alpha type, very granulate (Figs 9a, 10a), with blots that resemble islands and reach the sides of ocularium (Figs 9a, 10a, 18c). Abdominal scutum widest at level of groove II; areas I–IV granulate. Carapace with some granules on the anterior region (Fig. 9a). Ocularium low without median depression, armed with a cluster of granules (Figs 9c–e, 10a–b). Lateral margins of DS with a few granules on the medial region (Fig. 10a). Metascutum delimited, divided into four areas: area I with a pair of medium-sized paramedian tubercles; area II with a pair of small paramedian tubercles; area III with a pair of paramedian, dome-shaped, coarsely granulated tubercles and another pair of medium-sized tubercles, laterally displaced; area IV with a pair of small paramedian tubercles (Figs 9c, 10a–b). Posterior border of scutum sub-straight and with a row of tubercles. Free tergites I–III with a row of tubercles (Figs 9a, 9d–e, 10a–b).

**Venter** (Fig. 9b): Stigmatic area with a few granules. Stigmata large, oval and transverse. Coxa I with two parallel rows of tubercles increasing size distally and with an anterior smooth space for the pedipalps to rest; coxa II longer than coxa I, granulate; coxa III longer than I and II, granulate, with posterior margin sigmoid; coxa IV strongly backward, granulate. Genital operculum slightly granulate.

**Pedipalps** (Figs 11a–c): Coxa dorsally and ventrally with one meso-distal granule. Trochanter with one dorsal short tubercle and two ventral tubercles fused at base (mesal taller); femur compressed, dorsally with a row of aligned setiferous tubercles of different sizes—not reaching the distal portion—, ventrally the same, tubercles just more separated between them. Patella distally depressed with dorsal granules; tibia depressed, spoon-shaped, dorsally granulate, with lateral borders tuberculate and some spiniferous tubercles at distal portion; inner surface slightly striated (Fig. 11b). Tarsus long, conical, with some dorsal granules and ventrally with two rows of thickened setae (Fig. 11c).

**Chelicera** (Figs 9, 11d–f): Chelicera swollen. Basichelicerite rectangular, with a few granules, the proximal border with a row of separated tubercles and the anterior border smooth, the ectal face with two large proximal joined tubercles and a group of four distal tubercles, the dorso-distal and the basal-distal ones larger than the others, the mesal face with some small granules (Figs 11d–e). Hand with one tubercle near the joint of the movable finger. Fixed finger with the inner surface finely grooved. Movable finger with one conical, sub-basal tooth and with the distal portion of the inner surface dentate (Fig. 11f).

**Legs** (Figs 9a–b, 10c–e): Coxae I–II dorsally with one posterior process; coxa III with one proximal retrolateral tubercle; coxa IV coarsely granulate, with a prominent anterolateral *clavi inguines* and with a postero-lateral multicapitate apophysis (Fig. 9a). Trochanter I–II dorsally with some minute granules and ventrally with some tubercles; trochanter III with some dorsal and ventral granules (Fig. 10d); trochanter IV more granulate than III, with one proximal tubercle and a row of ventral tubercles in retrolateral view (Fig. 10e). Femora I–IV sub-straight, very granular; III–IV dorsally granulate (IV more granular than III) and ventrally with two longitudinal rows of triangular tubercles all along its length and one prolaternal and one retrolateral row of tubercles, increasing in size distally: in femur III the last one tubercle thinner and in femur IV, the two last tubercles close together (Figs 10d–e). Patellae I–IV dorsally very granulate, curved; patellae III–IV with the distal border coarsely granular, ventrally densely granulate and with two large tubercles on the retrolateral-ventral side. Tibiae I–IV granulate; tibiae III–IV strongly curved, with two longitudinal rows of tubercles—of different sizes—very close together in all the length (in tibia IV the distal tubercle is fused and the prolatetal row of tubercles almost joins the ventral row) (Figs 10d–e). Metatarsus I–IV with one ventrodistal seta. Tarsi I–II with one smooth claw; tarsi III–IV with 2 subparallel smooth claws and a tarsal process (Fig. 10c). Tarsal counts: 6(3)–6(3)/13(3)–15(3)/9–9/11–11. Intraspecific variations in Table 2.


**Male genitalia** (Figs 11f–h): VP of penis subrectangular with very concave distal border; VP with two lateral,
elongated, dense patches of type 4 microsetae and a longitudinal gap in between (Fig. 11h). VP with two apical MS C curved and laterally inserted; two MS D, the most distal large and straight, following the same lateral row as MS C; the other (D2) smaller, inserted dorso-laterally on the middle third of VP; two MS A straight and laterally inserted, near D2 (Fig. 11g); two small MS E volcano-shaped on the ventral face, close together; one small MS B volcano-shaped inserted laterally at the base of the VP (Fig. 11h). Glans mostly smooth; stylus long, tip surface tuft-shaped, fin-like process (Fig. 11f).

Female. Similar to male, but differs by having carapace at areas I–IV level more globose; anterior part of carapace narrower and coda divergent; tubercles of area III taller; legs III–IV thinner; tubercles in ventral rows of legs III–IV smaller; chelicerae are not hyperthelic in females (Figs 9d–e).


Rhaucus robustus (Mello-Leitão, 1941) comb. nov.
(Figs 1c, 12–14, 18d, 23)

Megarhaucus robustus Mello-Leitão, 1941: 169, fig. 4; Kury, 2003: 87.

Type material. Holotype ♀ (MNRJ 150), Colombia, Boyacá, La Uvita, examined.

Distribution and habitat. COLOMBIA, Boyacá Department: La Uvita, Tipacoque. Santander Department: Cerrito, Carcasi, Guaca. Between 2850 and 3585 m a.s.l., in Magdalena Valley montane forests ecoregion and Northern Andean páramos. It is the northermost species of the genus (Fig. 23).

Diagnosis. DS weakly granulated (Fig. 13a; contrasting with all other species of Rhaucus); reticulated pattern of yellow blots only along lateral margins of DS (contrasting with R. serripes that exhibits blots all over the DS), without transverse lines (Figs 12a, 13a; contrasting with R. vulneratus, R. quinquelineatus and R. florezi sp. nov.); spines in area III conical and dome-shaped (Fig. 12c; differing from R. serripes that exhibits more robust and granular spines).

Redescription. Male (ICN-AO-1161).
Measurements: CL=2.3, CW=5, AL=4, AW=5.6, BaCh=1, FeL III=5.5, FeL IV=7.5, TiL III=3.7, TiL IV=5. Intraespecific variation of body and appendages measurements in Table 1.

Dorsum (Figs 12a, 12c, 13a–b, 18d): Dorsal scutum alpha type, weakly granulate (Fig. 12a), with blots that resemble a reticle and reach the sides of ocularium and extend to scutal area III (Figs 12a, 18d). Abdominal scutum widest at level of groove II; areas I–II mostly smooth, III–IV with some granules. Carapace with some granules on the anterior region (Fig. 12a). Ocularium low without median depression, armed with a row of granules (Figs 12c–
Lateral margins of DS smooth on the medial region (Figs 13a–b). Mesotergum delimited, divided into four areas: area I with a pair of short paramedian tubercles; area II with a pair of tiny tubercles; area III with a pair of paramedian, domed/mammilliform, coarsely granulated tubercles; area IV with a pair of small paramedian tubercles (Figs 12c, 13a–b). Posterior border of scutum sub-straight and with a row of tubercles. Free tergites I–III with a row of tubercles (Figs 13a–b).

Venter (Figs 12b): Stigmatic area with a few granules. Stigmata large, oval and transverse. Coxa I with two parallel rows of fused tubercles increasing size distally and with an anterior smooth space for pedipalps to rest; coxa II longer than coxa I, granulate; coxa III longer than I and II, granulate, with posterior margin sigmoid; coxa IV strongly backward, granulate. Genital operculum slightly granulate.

Pedipalps (Figs 14a–c): Coxa dorsally and ventrally with one meso-distal granule. Trochanter with one dorsal short tubercle and one ventral tubercle; femur compressed, dorsally with a row of aligned setiferous tubercles of different sizes—not reaching the distal portion— and ventrally the same, slightly more separated from one another.
(the three/four basal-most setiferous tubercles fused). Patella distally depressed with some dorsal granules; tibia depressed, spoon-shaped, dorsally with some granules, with lateral borders tuberculate and some spiniferous tubercles at distal portion; inner surface slightly striated (Fig. 14b). Tarsus long, conical, with some dorsal granules and ventrally with two rows of thickened setae (Fig. 14c).

Chelicera (Figs 12, 13a–b, 14d–f): Chelicera very swollen. Basichelicerite rectangular, with a few dispersed granules, the proximal border with some separated medial tubercles and the anterior border smooth, ectal face with one large proximal tubercle and a group of three distal tubercles, the larger one with three irregularly shaped tips, mesal face with some small granules (Figs 14d–e). Hand with one tubercle near the joint of the movable finger. Fixed finger slightly curved with the inner surface finely grooved. Movable finger with one conical, sub-basal tooth and with the inner surface at distal portion dentate (Fig. 14f).

Legs (Figs 13c–e): Coxae I–II dorsally with one anterior and one posterior process; coxa III with one proximal retrolateral tubercle; coxa IV granulate, with a prominent anterolateral clavi inguines and with a posterolateral multicapitate apophysis (Fig. 13a). Trochanters I–IV dorsally with some minute granules and ventrally with some tubercles; trochanter III with some large tubercles at retrolateral face (Fig. 13d); trochanter IV more granulate than III, with groups of small granules visible in retrolateral ventral view (Fig. 13e). Femora I–IV sigmoidal, very granular; III–IV, dorsally densely granulate, ventrally with two longitudinal rows of triangular tubercles along the entire length, and one in size distally: in femur III the distal-most tubercles of the protalateral side are thinner and curved than those of femur IV (Figs 13d–e). Patellae I–IV dorsally very granulate, curved; patellae III–IV with large tubercles in the distal border ventrally very granulate and with one or two tubercles in the retrolateral ventral side. Tibiae I–IV granulate; tibiae III–IV very curved, with two longitudinal rows of tubercles –of different sizes and shapes– very close together along the entire length (in tibia IV the distal tubercles are grouped and some are fused or paddle shaped) (Figs 13d–e). Metatarsus I–IV with one ventrosternal seta. Tarsi I–II with one smooth claw; tarsi III–IV with 2 subparallel smooth claws and tarsal process (Fig. 13c). Tarsal counts: 6(3)–6(3)/15(3)–14(3)/10–10/?–11. Intraspecific variations in Table 2.


Male genitalia (Figs 14g–j): VP of penis subrectangular with slightly concave distal border; VP with two lateral, elongated, dense patches of type 4 microsetae, separated by a longitudinal space in between (Fig. 14j). VP with two apical MS C curved and laterally inserted; two MS D, the most distal large and straight, following the same lateral row as MS C, and the other smaller, inserted dorso-laterally on the middle third of VP (Figs 14g–h); two MS A straight and laterally inserted, near D2 (Fig. 14g); two small MS E volcano-shaped on the ventral face; one small MS B volcano-shaped inserted laterally at the base of the VP (Fig. 14i). Glans mostly smooth; stylus long, wattle barbels long (Fig. 14j), finger-like process acuminated, enlarged (Fig. 14g).

Female. Similar to male, but differs by having carapace at areas I–IV level more globose; anterior part of carapace narrower and coda divergent; tubercles of all scutal areas shorter; legs III–IV thinner than male; tubercles in ventral rows of legs III–IV smaller; chelicerae not hyperthelic (Figs 12d–e).

Other material examined. 3 specimens (1 male, 2 females) in 3 lots. COLOMBIA: Boyacá Department: Tipacoque, 1♂ (ICN-AO-1161), Vereda La Calera [06°23'N 72°43'W], 2850 m, 2.ii.2013, N. Beltran leg. Santander Department: Cerrito, 2♀ (1AvH-3000166/1AvH-I-12), Vereda El Mortiño, Parada El Almorzadero [6°19'N 72°33'W] (and not 07°56'N 72°45'W as in the original label), 3585 m, 25.ii.1999, E. González & A. Pulido leg.

Examined by photograph: 1♂ 1♀ (CBUP-I), Santander Department: Carcasí [6°37'N 72°37'W], 2900 m, under rocks, C. Ríos-Malaver leg.; Guaca, 1♂ [6.914077 -72.756683], 3200 m, J. Uribe leg.

Rhaucus florezi new species
(Figs 1e, 15–17, 18e, 23)

Etymology. The species name is a genitive noun in honor to the Colombian arachnologist Eduardo Flórez, for his contributions to the study of Colombian arachnids.

Type material. Holotype ♂ (ICN-AO-1187), COLOMBIA, Boyacá Department: Tipacoque, Vereda La Calera
[06°23'N, 72°43'W], 2800 m, 1–5.iv.2013, M. Medrano leg. – Paratype: 1♂ (ICN-AO-1187.1), same data as the holotype.

**Distribution and habitat.** COLOMBIA, Boyacá Department: Pisba, Susacón, Tipacoque, Villa de Leyva. Between 2800 and 3500 m a.s.l., in Northern Andean páramo and Magdalena Valley montane forests ecoregions (Figs 23, 24a).

**Diagnosis.** Leg IV coarsely granulated, with one prolateral and one retrolateral row of robust tubercles (Fig. 16e; contrasting with the weakly granulated leg IV of *R. quinquelineatus*); a pair of short mammilliform spines in area III (Fig. 15c; contrasting with the high domed spines of *R. robustus, R. serripes* and *R. quinquelineatus*, and differing from *R. vulneratus* by having sharper tips).

**Description.** Male holotype (ICN-AO-1187)

**Measurements:** Holotype: CL=2.1, CW=4.1, AL=2.8, AW=5.2, BaCh=0.9, FeLIII=4.1, FeL IV=5, TiL III=2.8, TiL IV=4. Intraspecific variation of body and appendages measurements in Table 1.

**Dorsum** (Figs 1e, 15a, 15c, 16a–b, 18e): Dorsal scutum alpha type, slightly granulate (Fig. 15a), with five yellow transverse curved lines that vary in length and shape and a reticulate pattern each side of ocularium (Figs 15a, 18e). Abdominal scutum widest at level of groove II; areas I–IV with some granules. Carapace with some granules on the anterior region (Fig. 15a). Ocularium low without median depression, with some granules (Figs 15c–e, 16a). Lateral margins of DS with a few granules on the medial region (Figs 16a–b). Mesotergum delimited, divided into four areas: area I with a pair of short paramedian tubercles; area II with a pair of tiny tubercles, laterally displaced; area III with a pair of paramedian, mammilliform, granulated tubercles; area IV with a pair of small paramedian tubercles (Figs 15c, 16a–b). Posterior border of scutum sub-straight and with a row of tubercles. Free tergites I–III with a row of tubercles (Figs 16a–b).

**Venter** (Fig. 15b): Stigmatic area with a few granules. Stigmata large, oval and transverse. Coxa I with two parallel rows of tubercles, increasing in size distally, and with an anterior smooth space for the pedipalp to rest; coxa II slightly longer than coxa I, granulate; coxa III longer than I and II, granulate, with posterior margin sigmoid; coxa IV strongly backward, granulate. Genital operculum slightly granulate.

**Pedipalps** (Figs 17a–c): Coxa dorsally and ventrally with one meso-distal granule. Trochanter with one dorsal short tubercle and one ventral tubercle; femur compressed, dorsally with a row of aligned triangular and acuminate setiferous tubercles of different sizes—not reaching the distal portion— and ventrally with a row of rounded tubercles (the two basal-most tubercles fused, the three distal-most tubercles smaller than the others). Patella distally depressed with dorsal granules, the distal taller; tibia depressed, spoon-shaped, dorsally granulate, with lateral borders tuberculate and some spiniferous tubercles at distal portion; inner surface slightly striated (Figs 17a–b). Tarsus long, conical, with some dorsal granules and ventrally with two rows of thickened setae (Fig. 17c).

**Chelicera** (Figs 15, 16a–b, 17d–e): Chelicera swollen. Basicheliculate rectangular, with a few granules; the proximal border with some tubercles, the dorso-ectal larger; ectal face with two basal small tubercles, one medium-sized tubercle slightly curved and a group of distal tubercles (one of them larger and curved); mesal face with some granules and one large distal tubercle (Fig. 17d). Hand with one tubercle near the joint of the movable finger. Fixed finger with the inner surface finely grooved. Movable finger with one conical, sub-basal tooth and with the distal portion of the inner surface dentate (Fig. 17e).

**Legs** (Figs 15a–b, 16d–e): Coxae I–II dorsally with one posterior process; coxa III with one proximal retrolateral tubercle; coxa IV coarsely granulate (Figs 15a, 16a), with a prominent anterolateral clavi inguines and a posterolateral multicapitate apophysis (Fig. 16a). Trochanters I–II dorsally with some minute granules and ventrally with some tubercles; trochanter III with some dorsal and ventral tubercles, and with one medium-sized, proximal prolateral tubercle and one retrolateral tubercle; trochanter IV with some dorsal and ventral tubercles, and with one large, proximal prolateral tubercle and one medium-sized retrolateral tubercle (Figs 16d–e). Femora I–IV sigmoid, granulated; III–IV ventrally with two longitudinal rows of tubercles along the entire length, and one prolateral and one retrolateral row of large tubercles (the retrolateral row of leg IV has the tubercles closer together compared to leg III) (Figs 16d–e). Patellae I–IV dorsally granulate, curved (patella IV with large tubercles at distal border) (Fig. 16e). Tibiae I–IV granulate; tibiae III–IV sub-straight, with two longitudinal rows of tubercles along its length (in tibia III the prolateral row has smaller tubercles than the retrolateral row); tibia IV with tubercles of similar size (the distal tubercle of retrolateral row is fused) (Figs 16d–e). Metatarsus I–IV with one ventrodistal setae. Tarsi I–II with one smooth claw; tarsi III–IV with 2 subparallel smooth claws and tarsal process (Fig. 16c). Tarsal counts: 6(3)–6(3)/13(3)–14(3)/9–9/9–9. Intraspecific variations in Table 2.

Male genitalia (Figs 17f–h): VP of penis subrectangular with slightly concave distal border; VP with two lateral, elongated, dense patches of type 4 microsetae, separated by a longitudinal space (Fig. 17h). VP with two apical MS C, curved and laterally inserted; two MS D, the most distal large and straight, following the same lateral row as MS C, and the other smaller, inserted dorso-laterally on the middle third of VP; two MS A straight and laterally inserted, near D2 (Figs 17f–g); two small MS E volcano-shaped on the ventral face; one small MS B volcano-shaped inserted laterally at the base of the VP (Fig. 17f). Glans mostly smooth; stylus long, wattle barbs long (Fig. 17g), finger-like process rounded, enlarged (Fig. 17f).

Female. Similar to male, but differs by having anterior part of carapace narrower and coda divergent; tubercles of area I and III shorter than male; legs III–IV thinner; tubercles in ventral rows of legs III–IV smaller; chelicerae not hyperthelic (Figs 15d–e).

Other material examined. 12 specimens (7 males, 5 females) in 11 lots. COLOMBIA. Boyacá Department: Villa de Leyva, 1♂ (ICN-AO-294), S.F.F. Iguaque sector Carrizal [05°41'N 73°27'W], 2800 m, 23.i.1998, L. Ballesteros leg.; 1♂ (ICN-AO-297), S.F.F. Iguaque sector Carrizal [05°41'N 73°27'W], 2900 m, 9.vi.2001, E. Flórez leg.; 1♂ 1♀ (MNRJ 8884), S.F.F. Iguaque sector Carrizal [05°41'N 73°27'W], 2800 m, 31.x.2004, E. Flórez,
FIGURE 19. Type material and labels of *Rhaucus vulneratus* and a junior synonym: a–c. *Rhaucus vulneratus*. a. Male syntype (MNHN CS 2793), habitus, lateral view; b. Female syntype, dorsal view; c. Labels. d–j. *Neorhaucus aurolineatus*. d. Male syntype (BMNH 1891.8.1.958–959), habitus, dorsal view; e. Ventral view; f. Left pedipalp and chelicera, ectal view; g. Label of Keyserling, containing BMNH complex number; h. Label of Sørensen with the species name as *Rhaucus aurolineatus*; i. Roewer’s label; j. Subsequent Roewer’s label, already combined with the generic name *Neorhaucus*. Images by R. Pinto-da-Rocha (a, c), E.-A. Leguin (b), A.B. Kury (d–j).

FIGURE 22. Central Colombia, showing the geographic distribution of *Rhaucus quinquelineatus* and *Rhaucus vulneratus*. Shaded areas in the background are WWF ecoregions. Abbreviations: NAP = Northern Andean Paramo; COMF = Cordillera Oriental Montane Forests; MVMF = Magdalena Valley Montane Forests. Solid red lines: administrative boundaries.
Discussion

A better understanding of the range of variation of diagnostic features for *Rhaucus* and the examination of the type material in museums allowed us to detect some synonymies. Pickard-Cambridge (1905) chose to isolate his genera (all monotypic) exclusively based on minor differences of tarsal counts. He had not seen Simon’s type material of *Rhaucus vulneratus*, and he examined only scarce material of this species, so he was unaware of the variation of some features. He also did not consider the primary subdivision of tarsus I into a basitarsus and a distitarsus. Therefore, according to the examined material the number of tarsomeres of leg I in *R. vulneratus* can be either 5 or 6 articles (Table 2), and all the basitarsomeres are thicker than the distitarsomeres (not only the first two, as Pickard-Cambridge stated). Consequently, the use of number of tarsomeres for making the distinction between *Pararhaucus* (tarsus I heptamerous), *Rhaucus* (tarsus I hexamerous) and *Neorhaucus* (tarsus I pentamerous) proposed by Pickard-Cambridge (1905) is not reliable. Likewise, the distinction of *Metarhaucus* (all 3 basitarsomeres I dilated) from *Rhaucus* (only the first two dilated) is fictional. Mello-Leitão (1941) differentiated *Megarhaucus* from *Rhaucus* by the area IV “armed with a pair of tubercles” in the former. However, as one can see in our illustrations, the area IV in all species of *Rhaucus* possesses a transverse row of granules, of which the medial two may be or may be not interpreted as paired “armature” in the Roewerian system.

The characters traditionally used to separate genera in Cosmetidae include: (1) length of legs, (2) number of tarsomeres in leg I, (3) number of swollen basitarsomeres, (4) granulation of dorsal scutum, (5) thickness of basal segments of legs III–IV and (6) size and height of tubercles on dorsal scutum. However, many authors have

![FIGURE 23. Central Colombia, showing the geographic distribution of *Rhaucus florezi* sp. nov., *Rhaucus serripes* and *Rhaucus robustus*. Shaded areas in the background are WWF ecoregions. Abbreviations: NAP = Northern Andean Páramo; COMF = Cordillera Oriental Montane Forests; MVMF = Magdalena Valley Montane Forests. Solid red lines: administrative boundaries.](image-url)
criticized the use of these characters (Henriksen 1932; Mello-Leitão 1933; Ringuelet 1959; Kury 1989; Kury 2003; Kury et al. 2007). Here, we introduce additional features to recognize and differentiate the species of *Rhaucus*, as detailed below.

**FIGURE 24.** Habitat of *Rhaucus* spp.: a. Montane forests at Iguaque Flora and Fauna Sanctuary, Boyacá (*Rhaucus florezi*, *Rhaucus quinquelineatus*, *Rhaucus serripes*), b. Páramo at Chingaza National Natural Park, Cundinamarca (*Rhaucus quinquelineatus*, *Rhaucus serripes*, *Rhaucus vulneratus*) [Photographs by A García (b) and courtesy of Miguel Medrano (a)].

**Variation of dorsal scutum blots.** The commonly decorated dorsal scutum of Cosmetidae is one of their more interesting and conspicuous characteristics (Kury & Pinto-da-Rocha 2007; Kury 2009). Some recent works have shown the variation of the patterns of the dorsal blots in some genera and species (e.g., Kury & Barros 2014 for *Taito* Kury & Barros, 2014; Medrano & Kury 2016 for *Platymessa* Mello-Leitão, 1941; Kury & García 2016 for *Flirtea*). In the case of *Rhaucus vulneratus* the five transverse orange lines (sometimes faded to yellow, depending on the time since collection or the ethanol concentration) may vary from continuous to divided in half, but
generally maintain the anterior line slightly thicker than the others and sometimes with small blots near the ocularium (Fig. 18a); nonetheless, one individual without lines was collected in Boyacá, a condition also observed in other preserved specimens as well (Fig. 1b). In R. quinquelineatus and R. florezi sp. nov., the five transverse yellow lines are very similar or may be continuous or divided (sometimes just one of the lines); blots are always present around the ocularium (Figs 18b and 18e, respectively). In R. serripes the blot pattern is unique (consisting of small isolated blot, herein described as island-blot pattern); it varies from almost entirely filled and closed blots to a few separated blots in center and laterals of DS (Fig. 18c). Finally, R. robustus most commonly exhibits a reticulate pattern restricted to the lateral margins of DS but does not extend into the center of the carapace (Figs 1c, 18d).

**Pedipalps of Rhaucus.** The foliaceous pedipalp represents a synapomorphy of Cosmetidae that have been illustrated and/or described for some genera (González-Sponga 1992; Kury & Pinto-da-Rocha 2007; Kury et al. 2007; Kury & Ferreira 2012; Kury & Barros 2014; Medrano & Kury 2016; Kury & García 2016). For example, the Amazonian genus Roquettea Mello-Leitão, 1931 possesses a tibia with a strong expansion that opposes the tarsus to form a rudimentary chela (Kury & Ferreira 2012: fig. 24), while Flirtea (Kury & García 2016: figs 6d–e), Platymessa (Medrano & Kury 2016: fig. 27) and Taito (Kury & Barros 2014: fig. 10) have a pedipalpal tibia that is narrower and slightly expanded distally. In the case of Rhaucus the pedipalpal tibia resembles a spoon (Fig. 4b).

**Clavi inguinés (ci) and apophysis of coxa IV.** In some harvestmen there is a dorso-basal structure on coxae IV of males, commonly called ‘groin warts’ (Kury & Barros 2014) and latinized as clavi inguinés (Medrano & Kury 2016). This structure has been illustrated in several contributions (Roewer 1912a,b, 1923; Mello-Leitão 1933) but only recently studied in two cosmetid genera (appearing only in some species); Taito, where the ci is a cluster of wrinkled granules (Kury & Barros 2014: fig. 14c) and Eulibitia Roewer, 1912, where it is a group of irregular tubercles, one or two of which are larger than the others (Medrano & Kury 2016: fig. 6). In Rhaucus, the clavi inguinés is made up of a group of at least seven prominent tubercles (also visible in dorsal view) (Fig. 4i), a condition that seems exclusive to this genus.

**Male genitalia of Rhaucus.** The male genitalia in Opiliones is an important source of information and has been explored in taxonomic and phylogenetic studies (Kury 1992a,b, 1994, 1997; Pinto-da-Rocha & Kury 2003; Yamaguti & Pinto-da-Rocha 2009; Pinto-da-Rocha & Bonaldo 2011; Kury 2014; Kury & Barros 2014; Kury & Villarreal 2015). In the case of Rhaucus, there are some characteristics that deserve attention:

**Microsetae.** The presence of microsetae (ms) on the ventral plate of Opiliones defines a clade called ‘Microsetata’, grouping Cosmetidae, ‘Greater Gonyleptidae’ (GG = Cranaidae + Gonyleptidae + Manaosibiidae), and Metasarcidae. Members of this group possess scale-bristle microsetae types 1, 3 and/or 4 (mentioned in Kury 2014 and Kury & Villarreal 2015, but only illustrated in Kury 2016). In Figs 5c and 5e the type 4 ms are shown for Rhaucus, distributed in two groups (not reaching the center of VP) and differing from other genera within Cosmetidae: Cynorta has type 1 ms covering all the VP (unpublished data), Platymessa has type 4 ms restricted to the lateral margins of VP (Medrano & Kury 2016). Flirtea does not possess ms (Kury & García 2016), Taito has type 4 ms on the lateral margins and type 1 ms in the apical medial region (Kury & Barros 2014). It is interesting that in Rhaucus quinquelineatus only type 1 ms appear in the center of the VP (Fig. 8h), and are thus considered a putative autapomorphy for this species.

**Stylus.** Among the Microsetata the stylus apex with a wattle (serrate caruncle) seems to be unique for Cosmetidae and Metasarcidae (Kury & Villarreal 2015). Among cosmetids, this has been illustrated, for example, for Flirtea (Kury & García 2016), Taito (Kury & Barros 2014) and Platymessa (Medrano & Kury 2016). In Rhaucus, all the species present some intraspecific variation in the wattle. In the material examined distinct stages of the wattle have been found, from very short tips (Fig. 8f), through intermediate tips (Fig. 11f), and to very long tips (Fig. 14j).

**Thumb-like process.** The thumb-like dorsal process was first named by Kury (1994) and subsequently used in some phylogenies (Yamaguti & Pinto-da-Rocha 2009; Kury & Villarreal 2015). In Rhaucus, this structure exhibits several forms: index-shaped in R. vulneratus (Fig. 5d), R. robustus (Fig. 14g) and R. florezi sp. nov. (Fig. 17f); spoon-shaped in R. quinquelineatus (Fig. 8f), and fin-shaped in R. serripes (Fig. 11f). This characteristic is diagnostic for the genus because it appears to be conserved intraspecifically, and enables the differentiation of one species from the others.

**Ovipositor of Rhaucus vulneratus.** In the opilionological literature the female genitalia of Central American Cosmetidae have been recently studied (Walker & Townsend 2014). In the present revision, the ovipositor of

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Rhaucus vulneratus (Figs 5f–g) was studied, thus making it the first Andean genus to be explored for this feature. The ovipositor morphology in Rhaucus is similar to that described for Cynorta, Erginulus, Holovonones Roewer, 1912, Paecilaena and Vonones in general shape, number of setae and peripheral lobes, and, interestingly, also in the multiple apices of setae tips. This character has been observed only in Cosmetidae, Stygnidae and Agoristenidae, but not in other families of Gonyleptoidea (Townsend et al. 2015; Villarreal & García 2016) and should be considered for future studies.

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