2016. Journal of Arachnology 44:65–75

Three new species of the Mexican harvestman genus *Chapulobunus* (Opiliones: Stygnopsidae)

Jesús A. Cruz-López[1,2] and **Oscar F. Francke**[1]: [1]Colección Nacional de Arácnidos, Departamento de Zoología, Instituto de Biología, Universidad Nacional Autónoma de México. Apartado Postal 70-153, 04510. Distrito Federal, Mexico; [2]Posgrado en Ciencias Biológicas, Universidad Nacional Autónoma de México; Av. Universidad 3000, C.P. 04510, Coyoacán, Distrito Federal, México. E-mail: thelyphonidito@gmail.com

Abstract. Three new species of the genus *Chapulobunus* Goodnight & Goodnight, 1946, are described: *Chapulobunus asper* sp. nov., *Chapulobunus psilocybe* sp. nov., and *Chapulobunus regiomontano* sp. nov. from the states of San Luís Potosí, Oaxaca, and Nuevo León, in Mexico, respectively. Additionally, an identification key to the five known species of the genus is provided.

Keywords: Taxonomy, Laniatores, Sierra Madre Oriental.

http://zoobank.org/References/urn:lsid:zoobank.org:pub:676FCD17-7BAA-4B60-96E9-5A16FE1748F1

The harvestman genus *Chapulobunus* Goodnight & Goodnight, 1946, and its type species *Chapulobunus unispinosus* Goodnight & Goodnight, 1946, were originally described in the family Phalangodidae, subfamily Stygnopsinae (Goodnight & Goodnight 1946). Subsequently, Goodnight & Goodnight (1953) considered this genus a junior synonym of the genus *Karos* Goodnight & Goodnight, 1944 (at that time allocated in the subfamily Phalangodinae), without providing any justification. Recently, *Chapulobunus* was resurrected from the synonymy with *Karos*, based on a cladistic analysis using morphological data (Cruz-López & Francke in press). In the same work, the genus was rediagnosed, the type species was redescribed, the male genitalia were illustrated and described for the first time, and the second species of the genus was described: *Chapulobunus poblano* Cruz-López & Francke, in press.

Phylogenetically, the genus belongs to the *Karos* genus-group, which is characterized by the following: the presence of lateral clear areas at the level of mesotergal area I, occasionally clear areas present on corners of area V and free tergites, ocularium displaced from the frontal margin, small chelicerae, cheliceral dentition in males homogeneous, without sexual dimorphism in cheliceral size and pedipalpal armature, pedipalpal femur with one meso-apical setiferous tubercle, ventral plate of penis slender, not differentiated from the truncus, and base of follis exposed (Cruz-López & Francke in press).

The sister group of *Chapulobunus* is the monotypic *Montabunus* Goodnight & Goodnight, 1945. These genera share a similar male genitalia pattern, differing primarily in the external morphology, *Montabunus* with an unarmed dorsum and midbulge of scutum small and level with mesotergal area I (see Cruz-López & Francke in press for phylogenetic details).

The genus is easily distinguished from other stygnopsids by the presence of a remarkably robust body, with lateral margins of scutums broadly convex, with a wide spine in the middle of mesotergal area II, with a prominent middle spine on area III; areas III and IV slightly fused, area III invading and dividing in two area IV; legs IV sexually dimorphic: males have femur or/and patella with ventral armature, stronger than on females; and pars distalis of the male genitalia medially swollen in dorsal/ventral views, lateral macrosetae forming an unique irregular row with several setae, three or more pairs of ventral microsetae and lateral projetions of glans pointed distally (Cruz-López & Francke in press).

The species of *Chapulobunus* have been found in pine forests in the Sierra Madre Oriental in Mexico (Figs. 1–4), with altitudinal range restricted between ca. 1600 and 2250 meters. Occasionally these are found under rocks, in small hollows (Fig. 5), but usually they are found under or inside of decomposing tree stumps (Fig. 6). They are commonly found forming small monospecific aggregations of three to six individuals (pers. obs.).

Herein, based on new material collected during recent field work in the region, three new species are described. Further, an identification key is provided to separate the five species currently in this genus.

METHODS

All material examined is deposited in the Colección Nacional de Arácnidos (CNAN), at UNAM, Mexico, and Texas Tech University (TTU), USA. Drawings were made in Photoshop CS5 software, using assembled photographs to delineate the structures. Microphotographs were taken using a Hitachi S-2460N Scanning Electronic Microscope. All plates were edited using the previously mentioned version of Photoshop. In addition to visual color approximations, the universal color guide Pantone® was used to ascertain the coloration of the new species. Morphological nomenclature follows Cruz-López & Francke (in press), pedipalpal armature follows Acosta et al. (2007), structures related to ozopores (lateral pegs) follows Gnaspini & Rodrigues (2011), and setal nomenclature of male genitalia according to Kury & Villarreal (2015). Height/width of the ocularium, height of spine III/height of spine II, height of spine III/height of ocularium ratios were calculated. Measurements of pedipalps are: trochanter/femur/patella/tibia/tarsus/claw, and legs are trochanter/femur/patella/tibia/metatarsus. All measurements are in mm. Distribution map was generated using gvSIG 1.11.0-RC1 software.

TAXONOMY

Family Stygnopsidae Sørensen, 1932
Genus *Chapulobunus* Goodnight & Goodnight, 1946

Chapulobunus Goodnight & Goodnight 1946:1; Cruz-López & Francke in press:000 (status revalidated).

Figures 1–6.—Habitats and microhabitats of species of *Chapulobunus*. 1. Habitat of *Chapulobunus asper* new species, pine forest from Buena Vista, near Ahuacatlán, Municipio de Xilitla, San Luís Potosí; 2 Habitat of *Chapulobunus poblano* Cruz-López & Francke in press, pine forest from Estación de microondas Tomaquillo, Municipio de Zacapoaxtla, Puebla; 3. Habitat of *Chapulobunus regiomontano* new species, pine forest from road to Mina la Huiche, Municipio de Galeana, Nuevo León; 4. Habitat of *Chapulobunus unispinosus* Goodnight & Goodnight 1946, pine forest from La Mojonera, Municipio de Zacualtipan, Hidalgo; 5. Microhabitat of *Chapulobunus regiomontano* new species, the red arrow indicates the aggregation of several specimens in a small hollow; 6. Microhabitat of *Chapulobunus unispinosus* Goodnight & Goodnight, 1946, decomposing logs.

Karos [in part]: Goodnight & Goodnight 1953:20 (generic synonymy transfer); Goodnight & Goodnight 1973: 83; Kury 2003: 238 (catalogue).

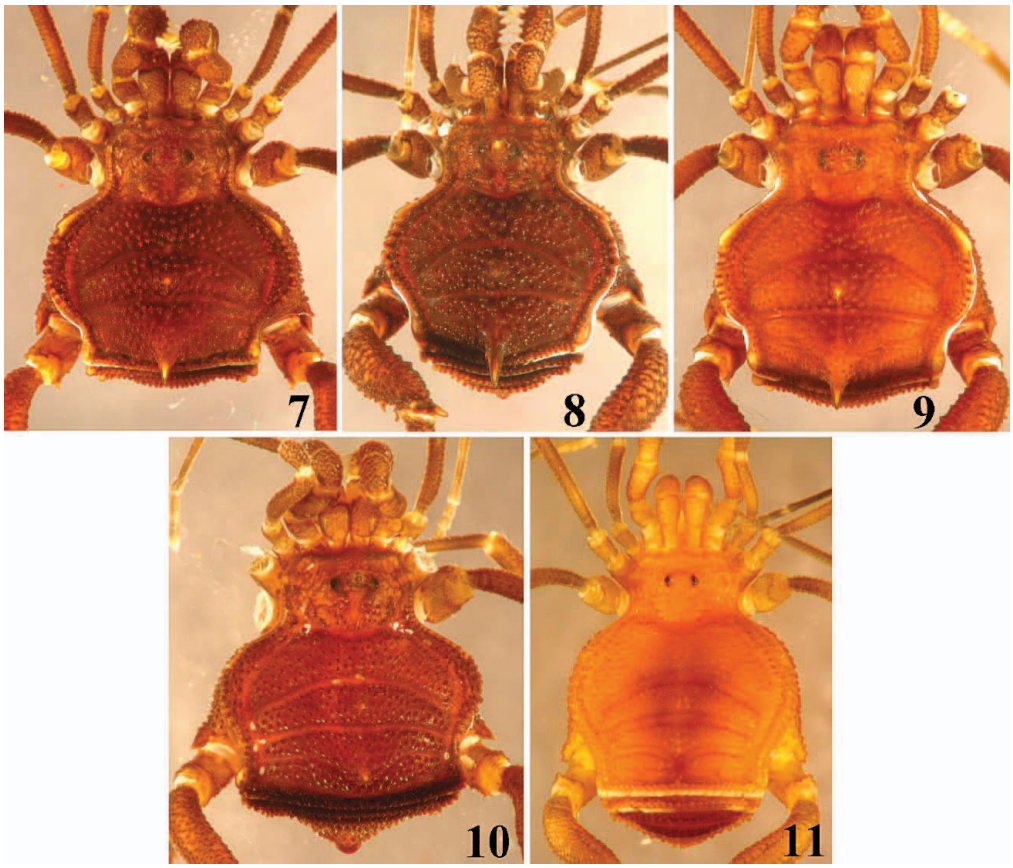
Type species.—*Chapulobunus unispinosus* Goodnight & Goodnight, 1946, by original designation.

Taxonomic considerations.—Cruz-López & Francke (in press) named the macro and microsetae of the penis according to their position. They recognized the lateral rows of macrosetae, ventral rows of microsetae and parastylar setae, this last term taken from Cokendolpher (2004). Recently, Kury & Villarreal (2015) proposed the first homology hypothesis in penial setation in Gonyleptoidea. These authors recognized five setal groups in a broad taxa sampling of many gonyleptoid families. Regarding Stygnopsidae, Kury & Villarreal detected these setal groups in *Hoplobunus boneti* (Goodnight & Goodnight, 1942), *Karos* sp. and the three genera of *Paramitraceras* genus-group (Cruz-López & Francke in press).

Here, we adopted the chaetotaxy nomenclature proposed by Kury & Villarreal (2015) and described the male genitalia of the new species with their terminology. On this, we had problems trying to detect any B setae in *Chapulobunus*. Kury & Villarreal (2015:6) said: "…A and B are mostly associated with each other…sometimes it is difficult to tell which one is B owing to their similar conformation, but often MS B are smaller…". Examining species of *Chapulobunus*, we do not find evidence to recognize any B setae, only *Chapulobunus psylocibe* new species exhibits a basalmost small seta, which could be interpreted as B. But to maintain consistency in the setal nomenclature in the genus, we consider that only groups A, C, D and E are present in *Chapulobunus*. Sometimes the C and A groups are easily distinguishable, such is the case of *C. unispinosus*, *C. poblano* (Cruz-López & Francke in press: Figs. 31, 34) and *Chapulobunus asper* new species (Figs. 21–23). However in *C. psylocibe* new species and *Chapulobunus regiomontano* new species, C and A setal groups are contiguous. These are recognizable only if the penis is seen dorsally or ventrally.

KEY TO SPECIES OF *CHAPULOBUNUS*

1. Ocularium blunt, with one small spine over each eye (Fig. 15). Anal plate in males without central bulge (Figs. 14, 38) 2
   Ocularium spiniform, pointed apically, without one small spine over each eye (Figs. 25, 27). Anal plate in males with central bulge (Figs. 10, 26) 4



Figures 7–11.—Male dorsal habitus of all species of *Chapulobunus*. 7. *Chapulobunus unispinosus* Goodnight & Goodnight 1946 from La Mojonera, Municipio de Zacualtipan, Hidalgo ; 8 *Chapulobunus poblano* Cruz-López & Francke in press, holotype; 9. *Chapulobunus asper* new species, holotype; 10. *Chapulobunus psilocybe* new species, holotype; 11. *Chapulobunus regiomontano* new species, holotype. These figures are not at the same scale.

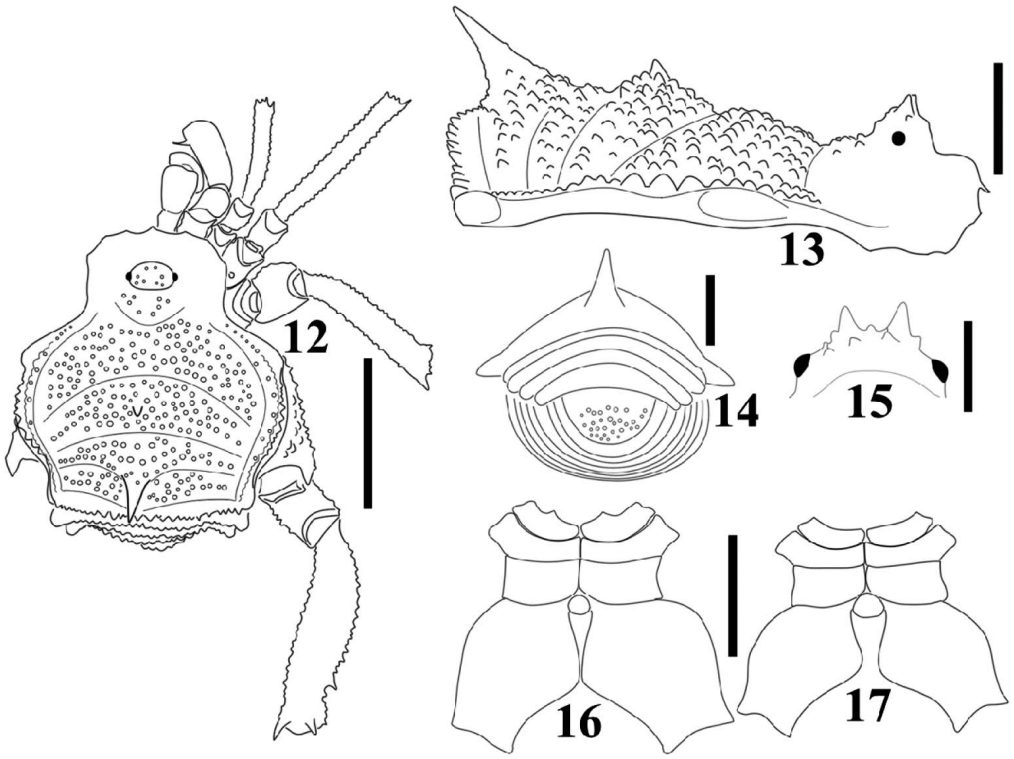
2. Spines of mesotergal areas II and III absent (Figs. 36, 37). Ventral tubercles of femur IV on males foliose (Figs. 42, 43) . . . . . *Chapulobunus regiomontano* sp. nov.
   Spines of mesotergal areas II and III present, long (Figs. 13, 25). Ventral tubercles of femur IV on males spiniform (Figs. 18, 19, 30, 31) 3
3. Males with ventral tubercles on femur IV similar in size (Cruz-López & Francke in press, Fig. 30A). Ocularium semi-triangular in frontal view, height/width ratio of ocularium 0.75 (Cruz-López & Francke in press, Fig. 29C). Penis with two pairs of D setae and two pairs of A setae (Cruz-López & Francke in press, Fig. 31). . . . . *Chapulobunus unispinosus*
   Males with ventral tubercles on femur IV dissimilar in size, apical longer than basal (Figs. 18, 19). Ocularium blunt in frontal view, height/width ratio of ocularium 0.50. Penis with three or four pairs of D setae and three pairs of A setae (Figs. 21–23) . . . . . *Chapulobunus asper* sp. nov.
4. Height spine III/II ratio 3. Ocularium in frontal view triangular (Fig. 27). Males with ventral tubercles of femur IV small, homogeneous in size. Penis with apical margin of pars distalis concave (Figs. 33–35). . . . . *Chapulobunus psilocybe* sp. nov.
   Height spine III/II ratio 5. Ocularium in frontal view spiniform (Cruz-López & Francke in press, Fig. 32C). Males with ventral tubercles of femur IV heterogeneous, small and large. Penis with apical margin of pars distalis con vex (Cruz-López & Francke in press, Fig. 34) . . . . . *Chapulobunus poblano*

Chapulobunus asper new species
http://zoobank.org/NomenclaturalActs/urn:lsid:zoobank.org:act:30BFA258-4EB2-4A4C-A681-934CA0674758
(Figs. 9, 12–23)

Material examined.—*Holotype:* MEXICO: *San Luís Potosí*: male, Buena Vista, near Ahuacatlán (21°20'26.340"N, 99°05'55.247"W), Municipio de Xilitla, 6 May 2011, O. Francke, A. Valdez, J. Cruz, G. Contreras and R. Monjaraz (CNAN-T0838).

Paratypes: MEXICO: *San Luís Potosí*: 1 male and 1 female, same locality and data (CNAN-T0839).

Other material: MEXICO: *San Luís Potosí*: 1 incomplete female DNA voucher from same locality and same data (DNA-Op0043).



Figures 12–17.—*Chapulobunus asper* new species, male holotype and female paratype. 12. Male habitus in dorsal view; 13. Male habitus in lateral view; 14. Male habitus in posterior view; 15. Male ocularium in frontal view; 16. Male habitus in ventral view; 17. Female habitus in ventral view. Scale bars: Figs. 12, 16, 17 = 2.5 mm; Figs. 13, 14 = 1.0 mm; Fig. 15 = 0.6 mm.

Etymology.—The specific name comes from the Latin *asper*, an adjective which means rough, in reference to the external appearance in this species.

Diagnosis.—This species can be differentiated from *C. poblano* and *C. psilocybe* by the absence of a central bulge in the anal plate in males (Fig. 14) and the ocularium lacks a median spine (Fig. 15). It differs from *C. regiomontano* by the ventral armature of leg IV, which is spiniform in *C. asper* (Figs. 18, 19). This species is very similar to *C. unispinosus*, but differs in: a) the height/width ratio of the ocularium in *C. asper* is 0.50, in *C. unispinosus* is 0.75, and b) the penis in *C. unispinosus* has two pairs of D setae, but on *C. asper* has three or four pairs (Fig. 21).

Description.—*Male holotype:* Measurements: scutum length 5.75, scutum maximum width 5.05, pedipalp 0.80/1.70/1.05/1.30/1.10/0.75, legs I 0.70/2.10/0.85/1.75/2.15, II 0.80/3.30/1.10/2.75/3.05, III 1.15/2.90/1.25/2.50/3.00, IV 1.50/4.35/1.50/4.05/4.40.

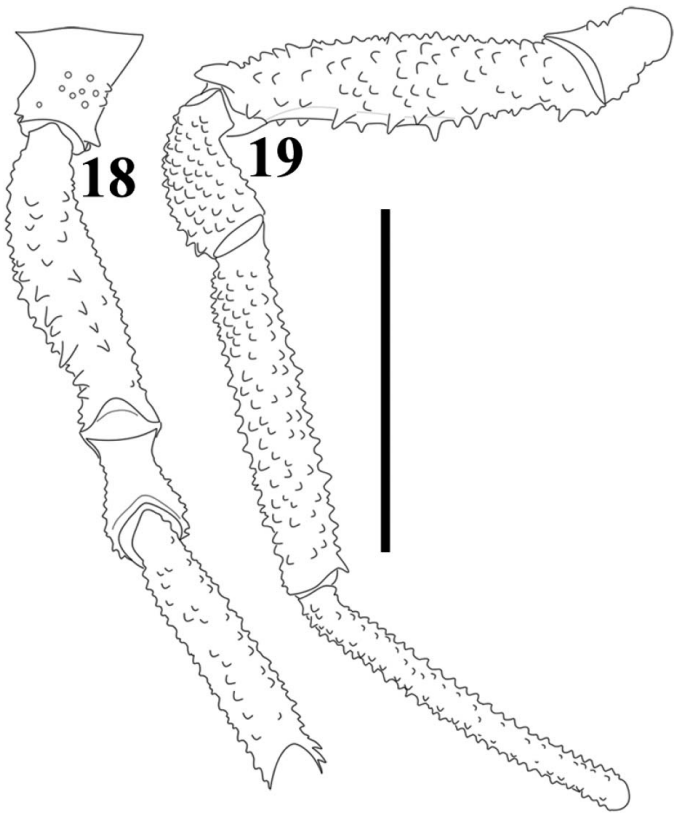
Dorsum: Mesotergum densely covered by rounded tubercles, these tubercles have one minute apical seta. Carapace with few tubercles, located posterior to ocularium. Ocularium height/width ratio = 0.5, dorsally covered by spiniform tubercles, two of these over each eye sharper. Pegs of the lateral row rounded, in a continuous line. Central spine of mesotergal area II small, height of central spine of area III = 1.00, height spine III/II ratio = 5, height spine III/ocularium ratio = 1.49, spine III pointing posteriorly. Six to seven extra lateral pegs, on widest part of scutum. Lateral clear areas in three regions: a) on the widest region of scutum, teardrop-shaped; b) posterior to first, not projected, with numerous slots; c) on the corners of area V, rounded and projected (Figs. 12–15, 20). Free tergites covered by tubercles similar to the dorsum. Corners of free tergites I and II with clear, rounded projections.

Venter: Covered similarly to dorsum. Stigmatic region plus sternum forming inverse "T" with the shaft constrained in the middle, arms curved posteriorly (Fig. 16). Coxae IV very large, with dorso-ectal apophysis. Genital operculum rounded, small, between anterior portions of coxae IV. Free sternites and anal plate covered by tubercles similar to dorsum.

Chelicera: Small, bulla not developed; fixed finger with five small teeth; movable finger with numerous small teeth, forming a serrula.

Pedipalp: Trochanter globular. Femur cylindrical; dorsally covered by minute tubercles, ventrally with five setiferous tubercles forming a row; one setiferous tubercle on meso-apical portion. Patella cylindrical, ornate with small tubercles, with three setiferous tubercles mesally. Tibia cylindrical, dorsally covered by small tubercles, with iiiII tubercles on ectal side ($4 > 5 > 2 > 1 = 3$), IiIi on mesal side ($1 = 3 > 4 > 2$). Tarsus smooth dorsally, conical, with IIIi setiferous tubercles on both sides ($1 = 2 = 3 > 4$). Claw slightly curved, shorter than tarsus.

Legs: Trochanter to tibia of legs covered by small tubercles, similar to dorsum; metatarsus and tarsus covered by small tubercles and setae. Legs III and IV stronger than I and II. All femora with two dorso-apical spines, retrolateral slightly larger than prolateral. Femur II with two irregular, ventral rows of spiniform tubercles. Metatarsus IV slightly curved. Trochanter III globose, bigger than the rest, with one dorsal spine mesally (Figs. 18, 19). Trochanter IV cylindrical, with one ventro-apical spine. Tarsal count 4(2):6(3):6:6.



Figures 18 and 19.—*Chapulobunus asper* new species, male holotype. 18. Trochanter to tibia IV in ventral view; 19. Trochanter to metatarsus IV in ectal view. Scale bar = 1.5 mm.

Genitalia: Pars distalis swollen in the middle, apical margin convex, irregular. Follis wide basally; latero-apical projections spiniform, pointed; inner side of follis, around the stylus, covered by small spiniform projections. Setae C group forming a mesoapical longitudinal row of five setae. Setae A group forming an irregular longitudinal row of three setae, the medium slightly ventrally, the basalmost setae slightly separated from the other two. Setae C and A groups visibly separated. Setae D group formed by three/four setae, basal to follis. Setae E group formed by two longitudinal rows of microsetae, at lateral margins of pars distalis. The two apical E setae close to each other, at the base of apical margin. The two basalmost E setae in the middle of par distalis (Figs. 21–23).

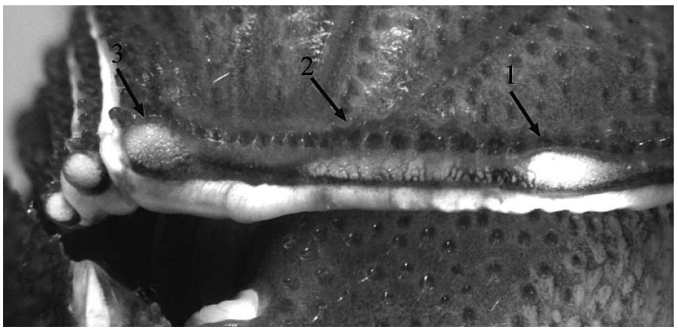


Figure 20.—*Chapulobunus asper* new species, male holotype. Detail of clear lateral areas of scutum. Numered arrows indicate the clear areas.

Color: In alcohol, this species is dark brown (Black 5 2X), but under the light of the microscope appears lighter (PMS 4625) (Fig. 9). Apical portion of legs is slightly lighter. Tips of dorsal spines II and III, and lateral clear areas are yellow brown (PMS 100).

Female paratype: Measurements: scutum length 5.40, scutum maximum width 4.65, pedipalp 0.75/1.45/0.95/1.10/1.05/0.70, legs I 0.65/1.90/0.80/1.47/1.95, II 0.65/2.95/1.05/2.42/2.67, III 1.00/2.67/1.12/2.15/2.55, IV 1.10/3.95/1.45/3.25/3.75. Differs from the male only in the less sharp ventral armature of femur IV, femur and tibia IV weaker, and shaft of the inverse "T" on venter slightly constrained in the middle (Fig. 17).

Distribution.—This species is known only from the type locality (Fig. 48).

Remarks.—When the specimens were found, they showed thanatosis behavior, which has been reported in the two previously known species of the genus (Cruz-López & Francke in press). The unusual asymmetry in the number of D setae, and variation in the position of the E microsetae are common features in specimens of this genus (also observed in *C. unispinosus* and *C. psilocybe*); unfortunately, a large series of male specimens is not available to analyze these peculiar variations in detail.

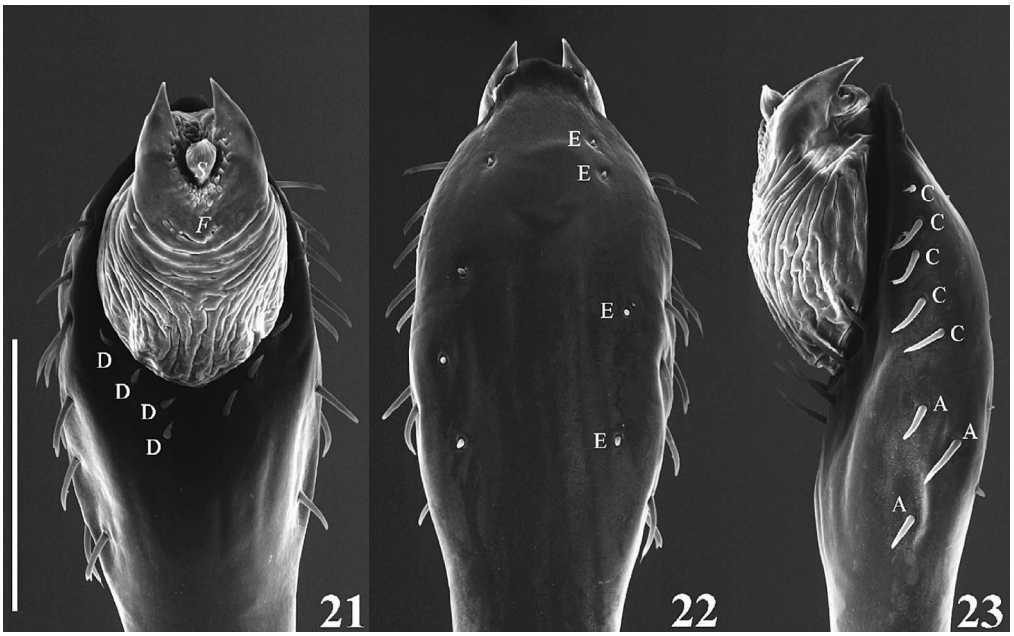
Chapulobunus psilocybe new species
http://zoobank.org/NomenclaturalActs/urn:lsid:zoobank.org:act:03792993-1542-46E6-8E4C-16C64C415D90
(Figs. 10, 24–35)

Material examined.—*Holotype*: MEXICO: *Oaxaca*: male: 4 km W. of Puerto de la Soledad (18º10'31.540"N, 97º00'17.207"W), Municipio de Huautla de Jiménez, 10 December 2011, G. Contreras, J. Mendoza, E. Hijmensen and E. Goyer, (CNAN-T0840).

Other material examined: MEXICO: *Oaxaca*: 1 incomplete female DNA voucher, same locality and data (DNA-Op0069); 1 female, same locality, except 11 September 2010, O. Francke, A. Valdez, D. Barrales and J. Cruz.

Etymology.—The specific name is a noun in aposition. The word *Psilocybe* is a generic epithet in mushrooms (Fungi). The species of that genus are well known for their hallucinogenic effects. The type locality is located at the municipality of Huautla. This municipality is well known because some local healers and shamans (e.g., the most popular, María Sabina) use these mushrooms in sacred rituals. The name refers to the co-existence of the mushrooms and this small stygnopsid harvestman.

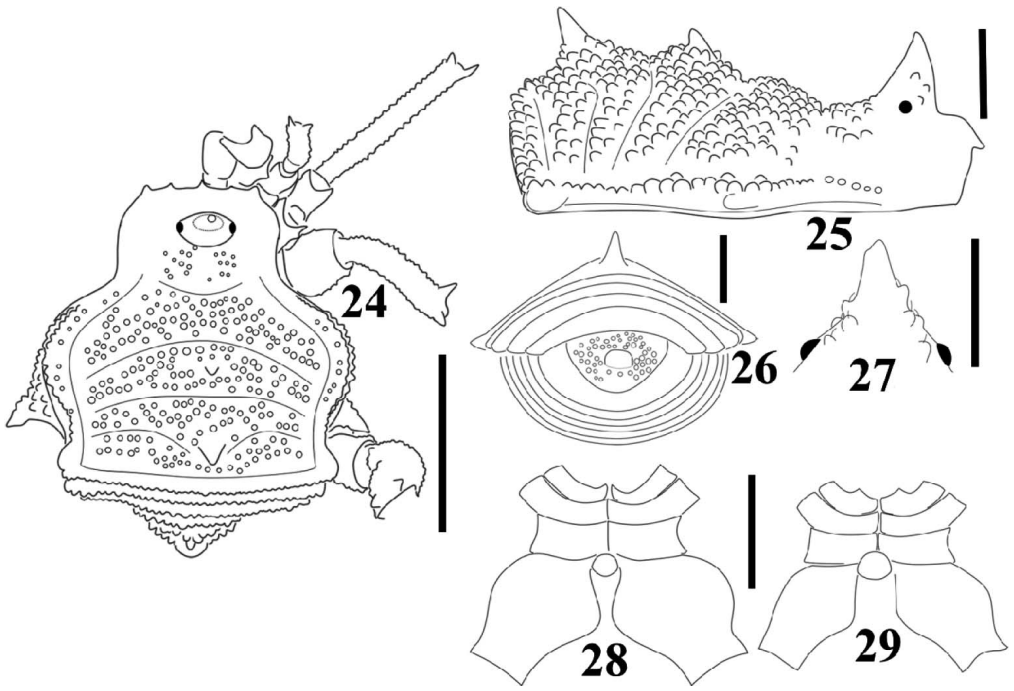
Diagnosis.—This species differs from *C. asper*, *C. regiomontano,* and *C. unispinosus* by the presence of a central bulge on anal plate on males (Figs. 10, 26), and the presence of a median spine on the ocularium in both sexes (Fig. 27). It differs from *C. poblano* in that *C. psilocybe* has a) ocularium triangular in frontal view (Fig. 27), the median spine is contiguous with the lateral margins of ocularium, whereas on *C. poblano* the ocularium is completely spiniform in frontal view; b) *C. poblano* has the ventral armature on femur IV well developed, sharp, whereas on *C. psilocybe* femur IV lacks ventral armature (Figs. 30, 31); and c) the apical margin of the penis is very concave (Figs. 33, 34), whereas in *C. poblano* it is convex, forming a rounded apex.



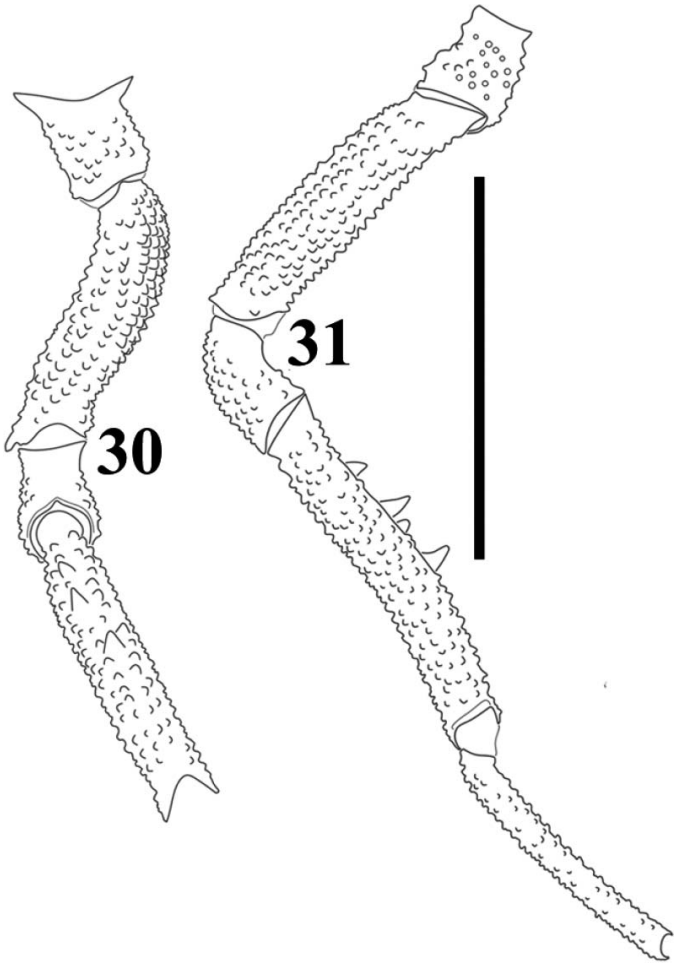
Figures 21–23.—*Chapulobunus asper* new species, male paratype, genitalia. 21. Dorsal view; 22. Ventral view; 23. Lateral view. Scale: 100μm. *S* = stylus, *F* = follis, D, E, C and A indicate setal groups.

Description.—*Male holotype:* measurements: scutum length 3.97, scutum maximum width 3.95, pedipalp 0.60/1.25/0.75/0.95/0.75/0.55, legs I 0.35/1.70/0.75/1.35/1.40, II 0.65/2.47/0.85/2.17/1.70, III 0.90/2.30/0.90/2.00/2.25, IV 1.00/2.80/1.15/3.25/2.75.

Dorsum: covered by rounded tubercles throughout. Carapace with tubercles only on posterior portion. Ocularium height/width ratio = 0.9, triangular-shaped in frontal view, dorsally forming an acute spine. Lateral pegs forming a discontinuous row, pegs similar to the dorsal tubercles. With eight to ten extra lateral pegs, some bifurcate. Central spine of area II small, height of central spine of dorsal area III = 0.45, height spine III/II ratio = 3, height spine III/ocularium ratio = 0.60, spine III pointing backwards. The first and second portions of



Figures 24–29.—*Chapulobunus psilocybe* new species, male holotype and female. 24. Male habitus in dorsal view; 25. Male habitus in lateral view; 26. Male habitus in posterior view; 27. Male ocularium in frontal view; 28. Male habitus in ventral view; 29. Female habitus in ventral view. Scale bars: Figs. 24, 28, 29 = 2.0 mm; Figs. 25, 26 = 0.5 mm; Fig. 27 = 0.7 mm.



Figures 30 and 31.—*Chapulobunus psilocybe* new species, male holotype. 30. Trochanter to tibia IV in ventral view; 31. Trochanter to metatarsus IV in ectal view. Scale bar = 1.0 mm.

lateral clear areas are not projected beyond cuticular surface, contiguous with numerous slots; third clear area rounded and projected, on the corners of area V (Figs. 24–28, 32). Free tergites covered by rounded tubercles. Corners of free tergites I and II with very small, clear, rounded projections.

Venter: covered similarly to dorsum. Stigmatic region plus sternum forming inverse "T," shaft of "T" slightly constrained in the middle, arms curved posteriorly (Fig. 28). Coxae IV very large; with small, dorso-ectal apophyses. Genital operculum rounded. Free sternites and anal plate covered by tubercles similar to dorsum, central portion of anal plate with noticeable rounded bulge (Fig. 26).

Chelicera: Small, bulla not developed; fixed finger with three small teeth, movable finger with a serrula.

Pedipalp: Trochanter globular, with small dorsal bulge. Femur cylindrical; dorsally covered by small tubercles; ventrally with one row of five setiferous tubercles, all of similar size, with one setiferous tubercle on meso-apical side. Patella ornate with small tubercles, mesal side with two setiferous tubercles. Tibia dorsally covered by small tubercles, with iII tubercles on ectal side (2 = 3 > 1), the basalmost separate from the other two, IiII on mesal side (3 > 1 = 4 > 2). Tarsus conical, without

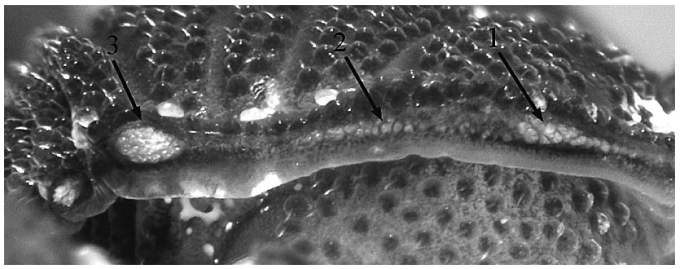


Figure 32.—*Chapulobunus psilocybe* new species, male holotype. Detail of clear lateral areas of scutum, holotype. Numbered arrows indicate the clear areas.

ornamentation, with III setiferous tubercles on both sides (1 = 2 = 3). Claw slightly curved, shorter than tarsus.

Legs: All segments except metatarsi and tarsi ornate with rounded tubercles, metatarsi and tarsi covered by small tubercles. Legs III and IV slightly stronger than legs I and II. Femora II to IV with two dorso-apical spines, retrolateral slightly larger than prolateral. Femur IV ornate with small, rounded tubercles similar in size. Tibia with ventral row of non-contiguous spiniform tubercles, heterogeneous in size. Metatarsus IV slightly curved (Figs. 30, 31). Trochanter III globose. Trochanter IV cylindrical, covered by small tubercles. Tarsal count 4(2):5(3):6:6.

Genitalia: Pars distalis swollen, apical margin concave, lateral apex irregular and dentate. Follis robust, latero-apical projections conical, slightly curved, very robust, inner side covered by small spiniform projections. Setae C group forming a longitudinal row of six macrosetae, the two basalmost at the same level. Setae A group forming a longitudinal row of four setae, the middle pair close to each other, the basalmost smaller. Setae D group with one/two pairs of macrosetae, basal to follis. Setae E group with three pairs of microsetae, the two more apical in a horizontal position, the basalmost slightly displaced to the middle of pars distalis. (Figs. 33–35).

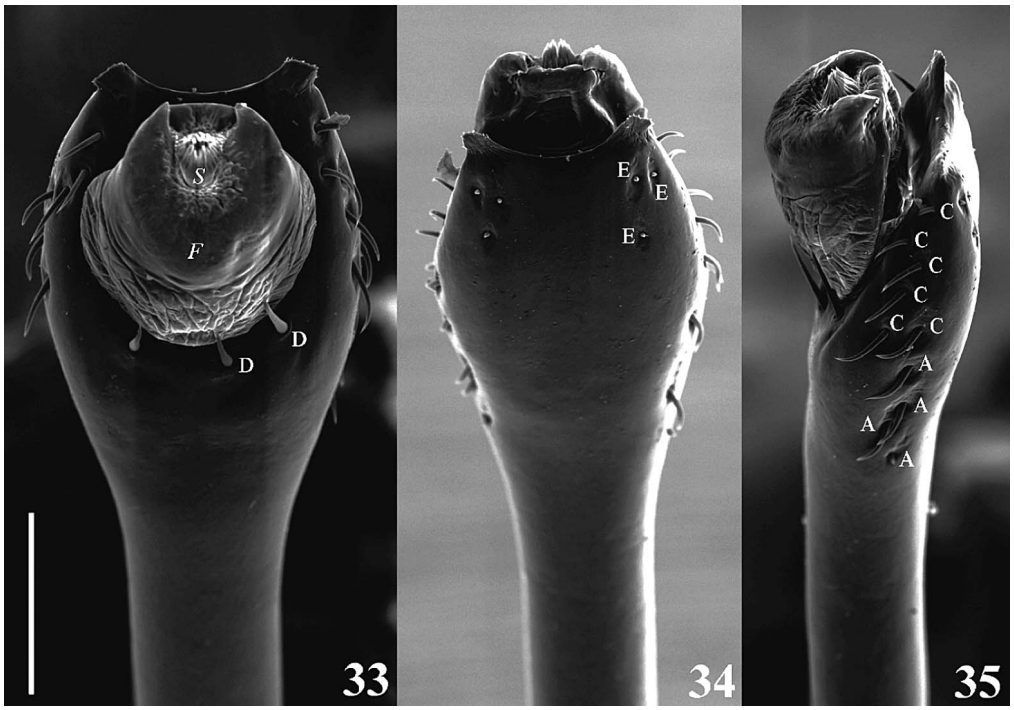
Color: In alcohol this species is reddish brown (PMS 1545), under light of the microscope seems PMS 1525 color (Fig. 10). Apical portion of legs is slightly lighter. Tips of dorsal spines II and III, and lateral clear areas are yellowish (PMS 125).

Female: measurements: scutum length 4.05, scutum maximum width 3.65, pedipalp 0.52/1.25/0.75/0.95/0.75/0.55, legs I 0.42/1.60/0.75/1.25/1.27, II 0.57/2.25/0.95/1.85/1.60, III 0.87/1.95/0.80/1.97/1.82, IV 0.95/2.70/0.97/2.65/2.70. Differs from the male in ventral armature of tibia IV, all ornamentation is formed by small rounded tubercles; absence of the central bulge on anal plate, and venter with shaft of inverse "T" very wide (Fig. 29).

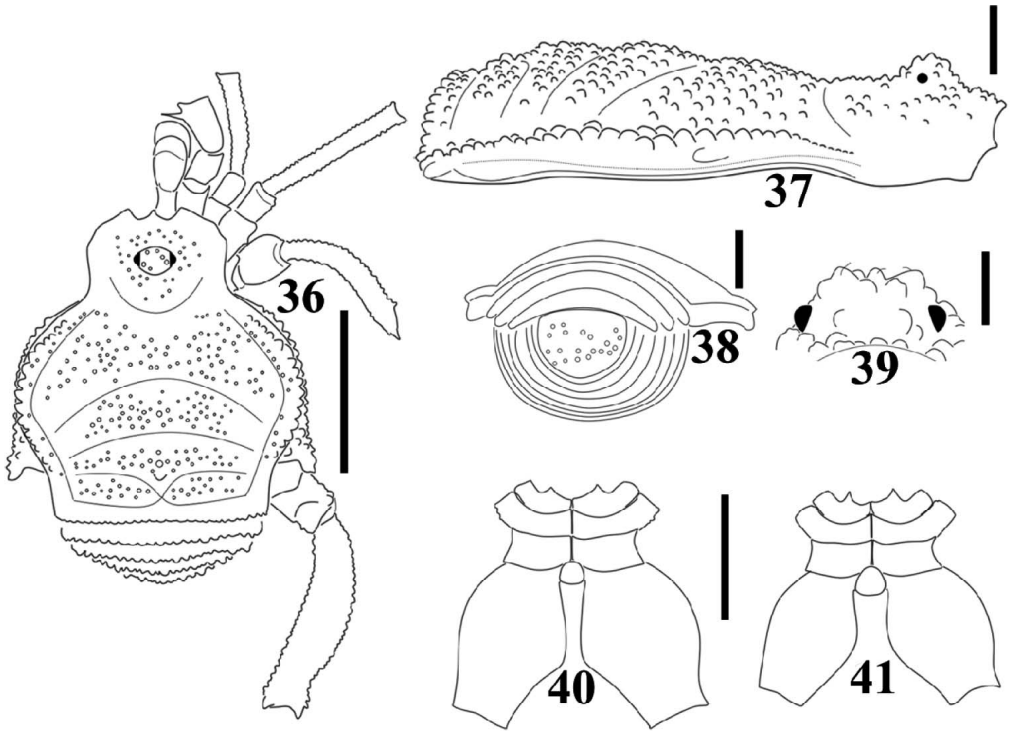
Distribution.—Only known from the type locality (Fig. 48).

Remarks.—As in its other congeners, this species showed similar defensive behavior (thanatosis) when first observed in the field. The holotype was found in aggregation with three undetermined *Hoplobunus* sp. (Stygnopsidae).

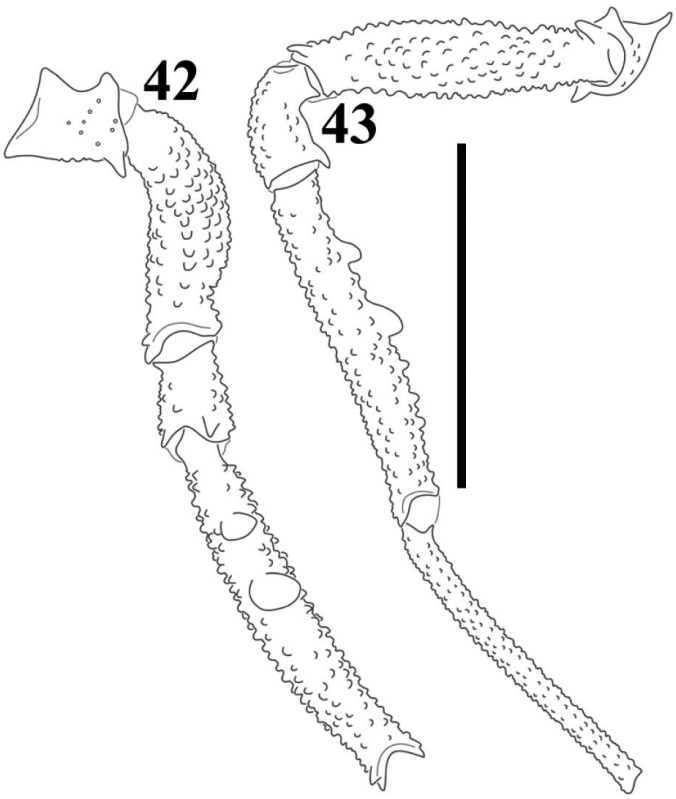
Chapulobunus regiomontano new species
http://zoobank.org/NomenclaturalActs/urn:lsid:zoobank.org:act:76D0F343-2883-4C96-80A6-AA144C8EF76D
(Figs. 11, 36–47)



Figures 33–35.—*Chapulobunus psilocybe* new species, holotype, male genitalia. 33. Dorsal view; 34. Ventral view; 35. Lateral view. Scale: 100μm. *S* = stylus, *F* = follis, D, E, C and A indicate setal groups.



Figures 36–41.—*Chapulobunus regiomontano* new species, male holotype, female paratype. 36. Male habitus in dorsal view; 37. Male habitus in lateral view; 38. Male habitus in posterior view; 39. Male ocularium in frontal view; 40. Male habitus in ventral view; 41. Female habitus in ventral view. Scale bars: Figs. 36, 40, 41 = 2.0 mm; Figs. 37, 38 = 1.0 mm; Fig. 39 = 0.5 mm.



Figures 42 and 43.—*Chapulobunus regiomontano* new species, male holotype. 42. Trochanter to tibia IV in ventral view; 43. Trochanter to metatarsus IV in ectal view. Scale bar: 0.8 mm.

Material examined.—*Holotype:* MEXICO: *Nuevo León*: male: 2 km W. of 18 de Marzo (24º54'04.320"N, 100º11'24.899"W), Municipio de Galeana, 28 November 2013, O. Francke, A. Valdez, J, Cruz, D. Barrales and A. Guzmán (CNAN-T0841).

Paratypes: MEXICO: *Nuevo León*: 1 male, 3 female, same locality and data as holotype (CNAN-T0842).

Other material: MEXICO: *Nuevo León*: 1 male and 1 incomplete female, DNA vouchers (DNA-Op0093 and DNA-Op0094), 2 km on road to Mina la Huiche (24º41'33.719"N, 100º03'19.908"W), Municipio de Galeana, 28 November 2013, O. Francke, A. Valdez, J. Cruz, D. Barrales and A. Guzmán.

Etymology.—The people from the capital of the state of Nuevo León, Monterrey, Mexico are called *regios* or *regiomontanos*. The specific epithet is used as a noun in apposition and is masculine in gender.

Diagnosis.—This species is easily distinguished from the other four because the ventral tubercles on tibia IV are foliose (Figs. 42, 43), whereas on the others they are spiniform. Additionaly, the median spine is absent on mesotergal areas II and III on *C. regiomontano* (Fig. 37).

Description.—*Male holotype:* measurements: scutum length 3.50, scutum maximum width 3.35, pedipalp 0.47/1.00/0.60/0.80/0.60/0.45, legs I 0.45/1.35/0.55/1.15/1.35, II 0.50/2.15/0.75/1.70/1.72, III 0.62/1.77/0.75/1.67/1.95, IV 0.70/2.57/0.85/2.75/2.80.

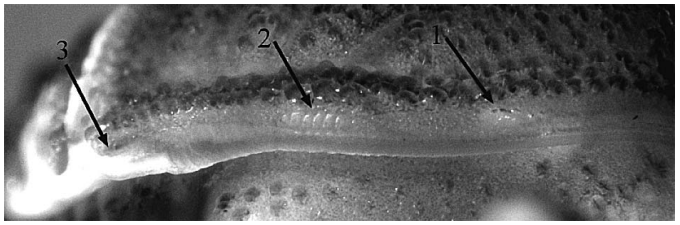


Figure 44.—*Chapulobunus regiomontano* new species, male holotype. Detail of clear lateral areas of scutum, holotype. Numered arrows indicate the clear areas.

Dorsum: Entire dorsum covered densely by rounded tubercles. Ocularium small, height/width ratio = 0.2, apical spines minute. Lateral pegs rounded, in a discontinuous line. Central spines of areas II and III absent, with only two vestigial, blunt tubercles. Extra lateral pegs formed by 11 to 12 spiniform tubercles, along lateral margin, between carapace and area II. Lateral clear areas in three portions: first, on middle of lateral margin, teardrop-shaped, inconspicuous and slightly projected; second with numerous slots, discrete; third on corners of area V, small, rounded and slightly projected. Free tergites covered by tubercles similar to dorsum. Corners of free tergites I and II with small, clear rounded projections (Figs. 36-39, 44).

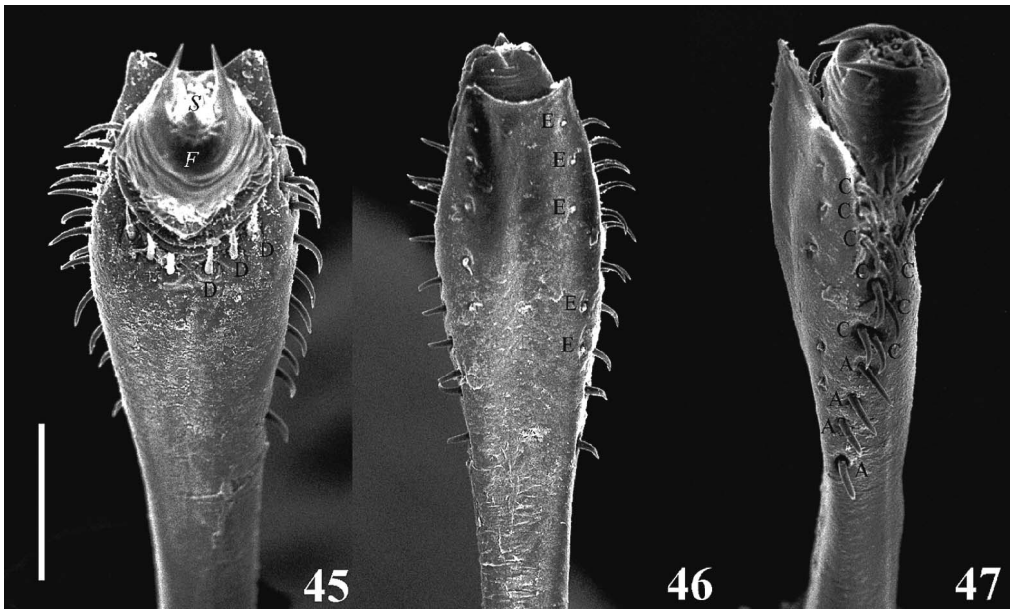
Venter: covered similarly to dorsum. Shaft of ventral inverse "T" slightly constrained in the middle, arms strong, curved posteriorly (Fig. 40). Coxae IV large, with dorso-ectal bifurcated apophysis. Genital operculum small, located between anterior portions of coxae IV. Free sternites and anal plate covered by small rounded tubercles.

Chelicera: Bulla not developed; fixed finger with three small teeth in the meso-apical portion; movable finger with a serrula.

Pedipalp: Trochanter globular, with small dorsal bulge. Femur dorsally covered by minute tubercles, ventrally with six setiferous tubercles in a row, the basalmost larger than the others; with one setiferous tubercle on meso-apical portion. Patella ornate with small tubercles, with three setiferous tubercles mesally. Tibia cylindrical, dorsally covered by small tubercles, with iIiII tubercles on ectal side ($4 > 5 > 2 > 3 > 1$), IIII on mesal side ($1 = 3 > 2 = 4$). Tarsus smooth dorsally, conical, with IIIi setiferous tubercles on both sides ($1 = 2 = 3 > 4$). Claw shorter than tarsus.

Legs: all segments covered by rounded tubercles, except metatarsus and tarsus that are covered by small tubercles and setae. Legs III and IV slightly stronger than I and II. Femora III and IV with two dorso-apical spines, both very small, retrolateral slightly larger than prolateral. Femur IV covered by tubercles throughout, without ventral armature. Tibia IV curved, ventrally with two mesal, foliose tubercles (Figs. 42, 43). Metatarsus IV slightly curved. Trochanter III globose, but slightly bigger than other trochanters. Trochanter IV cylindrical, with one dorsal and one ventral spiniform tubercles. Tarsal count 4(2):6(3):6:6.

Genitalia: Pars distalis slightly swollen, apical margin concave, lateral apex rounded. Follis wide basally; latero-apical projections tall, spiniform; inner side of follis, around the stylus, covered by small spiniform projections. Setae C group formed by longitudinal row of eight macrosetae, the median and basalmost setae forming subgroups of two or three setae. Setae A group forming a longitudinal row of four macrosetae, the



Figures 45–47.—*Chapulobunus regiomontano* new species, male paratype genitalia. 45. Dorsal view; 46. Ventral view; 47. Lateral view. Scale: 100μm. *S* = stylus, *F* = follis, D, E, C and A indicate setal groups.

basalmost slightly smaller and separated from the remaining A setae. Setae D group with three macrosetae, at the base of follis. Setae E group with two longitudinal rows of five microsetae, near to lateral margin of pars distalis. The three apical E setae separated from the two basalmost pairs (Figs. 45–47).

Color: In alcohol, this species is brown (PMS 1535), under light of the microscope matches PMS 160 color (Fig. 11). Apical portion of legs slightly lighter. Tips of dorsal spines II and III, and lateral clear areas are yellowish (PMS 106).

Female paratype: measurements: scutum length 3.47, scutum maximum width 3.17, pedipalp 0.47/0.97/0.60/0.81/0.60/0.45, legs I 0.35/1.30/0.50/1.05/1.20, II 0.47/1.82/0.65/1.55/1.65, III 0.55/1.70/0.67/1.40/1.65, IV 0.65/2.25/0.72/2.22/2.45. Differs from the male in having the shaft of inverse

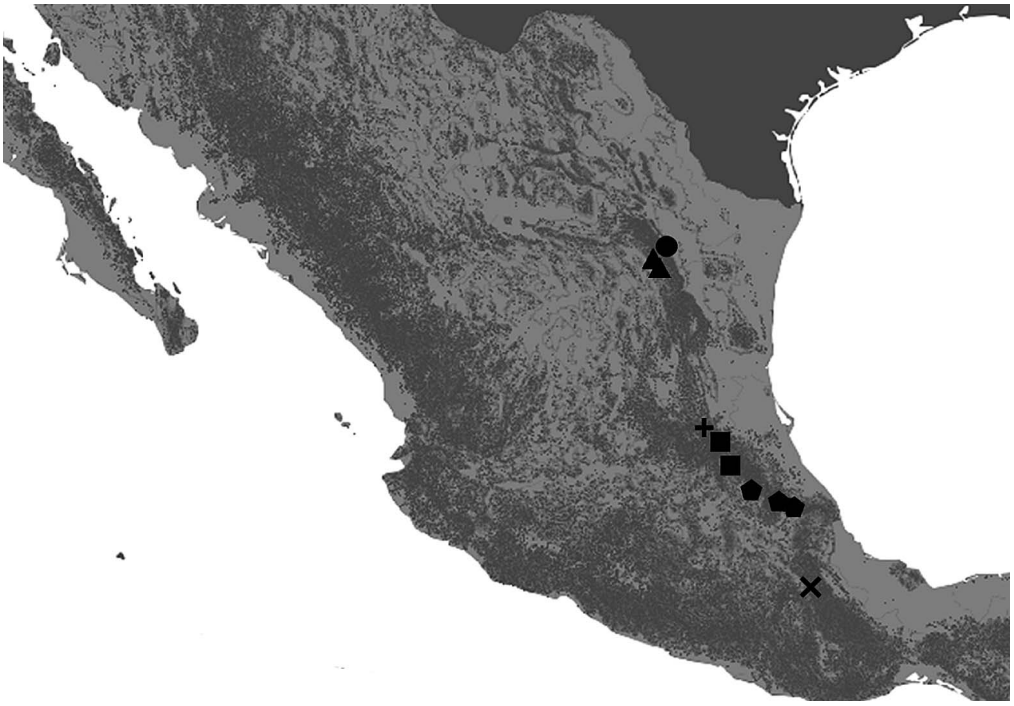


Figure 48.—Distribution map of the five known species of the genus *Chapulobunus*. ■: *Chapulobunus unispinosus* Goodnight & Goodnight, 1946; pentagons: *Chapulobunus poblano* Cruz-López & Francke, in press; ✚: *Chapulobunus asper* new species; ✖: *Chapulobunus psilocybe* new species; triangles: *Chapulobunus regiomontano* new species; circle: *Chapulobunus* aff. *regiomontano*.

"T" shorter and wider, and tibia IV without ventral foliose tubercles (Fig. 41).

Distribution.—Known only from the type locality and one nearby locality (Fig. 48).

Remarks.—The type species of the genus, *C. unispinosus* from Chapulhuacán, Hidalgo state, was described based only on females (Goodnight & Goodnight 1946). Subsequently, Goodnight & Goodnight (1973) examined one male and one female (TTU-Z 60,734) from "Chorros de Agua, E Rayones, 21 km WSW. of Montemorelos, Nuevo León," and described the male but these specimens were considered erroneously as *C. unispinosus* (Cruz-López & Francke in press). These specimens were examined by Cruz-López & Francke (in press) and for the present work; unfortunately, the material is poorly preserved and the male genitalia have been lost. Externally, these two specimens are very similar to *C. regiomontano* (both from central mountains in Nuevo León), but have very small central spines on areas II and III, and on the male tibia IV has five ventral foliose tubercles. Without fresh material of both sexes from that locality, it is difficult to determine if they are conspecific with *C. regiomontano* or if they represent a new species.

ACKNOWLEDGMENTS

The first author thanks the CONACYT, Posgrado en Ciencias Biológicas and Instituto de Biología, UNAM for financial support. We thank the members of the CNAN, for their effort in the field, especially R. Monjaraz for his suggestions on the manuscript. We thank two anonymous reviewers for their valuable suggestions. Finally, we thank B. Mendoza-Garfias for her assistance with SEM images.

LITERATURE CITED

Acosta, L.E., A. Pérez-Gónzalez & A.L. Tourinho. 2007. Methods for taxonomics study. Pp. 494–505. *In* Harvestmen. The Biology of Opiliones. (R. Pinto-da-Rocha, G. Machado, G. Giribet (eds.). Harvard University Press, Cambridge, Massachusetts.

Cokendolpher, J.C. 2004. Revalidation of the harvestman genus *Chinquipellobunus* (Opiliones: Stygnopsidae). Texas Memorial Museum, Speleological Monographs 6:143–152.

Cruz-López, J.A. & O.F. Francke. In press. Cladistic analysis and taxonomic revision of the genus *Karos* Goodnight & Goodnight, 1944 (Opiliones, Laniatores, Stygnopsidae). Zoological Journal of the Linnean Society.

Gnaspini, P. & G.C.S. Rodrigues. 2011. Comparative study of the morphology of the gland opening area among Grassatores harvestmen (Arachnida, Opiliones, Laniatores). Journal of Zoological Systematics and Evolutionary Research 49:273–284.

Goodnight, C.J. & M.L. Goodnight. 1944. More Phalangida from Mexico. American Museum Novitates 1249:1–13.

Goodnight, C.J. & M.L. Goodnight. 1945. Additional Phalangida from Mexico. American Museum Novitates 1281:1–17.

Goodnight. C.J. Goodnight. M.L. 1946. Additional studies of the Phalangid fauna of Mexico. 1. American Museum Novitates 1310:1–17.

Goodnight, C.J. & M.L. Goodnight. 1953. The Opilionid fauna of Chiapas, Mexico, and adjacent areas (Arachnoidea, Opiliones). American Museum Novitates 1610:1–81.

Goodnight, C.J. & M.L. Goodnight. 1973. Opilionids (Phalangida) from Mexican Caves. Bulletin of the Association for Mexican Cave Studies 5:83–96.

Kury, A.B. 2003. Annotated catalogue of the Laniatores of the New World (Arachnida, Opiliones). Revista Ibérica de Aracnología, Volumen especial monográfico 1:1–337

Kury, A.B. & O. Villarreal. 2015. The prickly blade mapped: establishing homologies and a chaetotaxy for macrosetae of penis ventral plate in Gonyleptoidea (Arachnida, Opiliones, Laniatores). Zoological Journal of the Linnean Society 174:1–46.

Manuscript received 3 June 2015, revised 14 September 2015.