



***Guerrobunus franckei*, a new species of troglobitic harvestman from Mexico (Opiliones: Laniatores: Phalangodidae)**

***Guerrobunus franckei*, una nueva especie de opilión troglobio de México (Opiliones: Laniatores: Phalangodidae)**

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Abstract. *Guerrobunus franckei* sp. nov. is described, from Guerrero, Mexico. This species is similar to *G. vallensis* Vázquez and Cokendolpher, 1997 in external troglomorphic characters but differs in the male genitalia. Differences and similarities of this new species with the other 3 known species of the genus are discussed.

Key words: male genitalia, Guerrero, cave system.

Resumen. Se describe *Guerrobunus franckei* sp. nov. procedente de Guerrero, México. La especie presenta caracteres troglomórficos similares a *G. vallensis* Vázquez y Cokendolpher, 1997, pero se diferencia en caracteres de los genitales masculinos. Se discuten las diferencias y similitudes de esta especie nueva con las restantes 3 conocidas del género.

Palabras clave: genitales masculinos, Guerrero, sistema de cuevas.

Introduction

The genus *Guerrobunus* Goodnight and Goodnight, 1945 comprises 3 species from the south central portion of the Transmexican Volcanic Belt, Mexico. This is the only genus of the family Phalangodidae Simon, 1879 that is distributed south of the western Nearctic, isolated from the other known North American genera of the family (Kury and Cokendolpher, 2000; Kury, 2003; Ubick, 2007). The assignment of this genus to phalangodids is currently uncertain and it should be tested by a cladistic analysis, not yet published (Ubick, 2007); however, the male genitalia of *G. arganoi* (Šilhavý 1974) and *G. vallensis* Vázquez and Cokendolpher, 1997 (illustrated by the respective authors), as well as the new species described herein, show a typical phalangodid unfolding glans (see Briggs and Ubick [1989] and Ubick and Briggs [1989, 2002, 2008]).

Vázquez and Cokendolpher (1997) distinguished these species based on troglomorphic characters: *G. minutus* Goodnight and Goodnight, 1945 (type species), with eyes darkly pigmented; *G. vallensis*, with unpigmented and reduced eyes; and *G. arganoi*, eyeless. In this contribution

G. franckei sp. nov. is described and compared to these species. It is very similar to *G. vallensis* (both have unpigmented and reduced eyes), but differ in the male genitalia; furthermore, they come from different type localities (caves), in different cave systems (Bonet, 1971; Sprouse and Sprouse, 1985). Troglobitic harvestmen and other troglobitic arachnids usually have restricted distributions, associated only to the type locality and very close and related caves, with a common geological history (Ubick and Briggs, 2008; Francke, 2009; Hedin and Thomas, 2010).

Materials and methods

The material examined is deposited in the Colección Nacional de Arácnidos (CNAN), UNAM. Photographs were taken with a Nikon Coolpix S10 VR camera. Male genitalia photos were taken using a Hitachi S-2460N Scanning Electronic Microscope. All figures were edited in Photoshop CS5. Measurements are given in mm. Pedipalps measurements: femur/patella/tibia/tarsus, leg measurements: femur/patella/tibia/metatarsus. Male genitalia nomenclature follows Ubick and Briggs (2008), with the following modifications: dl= dorsolateral setae, ml= lateral microsetae, pl= parastylar lobes, vl= ventrolateral setae, and vm= ventromedial setae.

Description

Guerrobunus franckei sp. nov. (Figs. 1-3, 5-7)

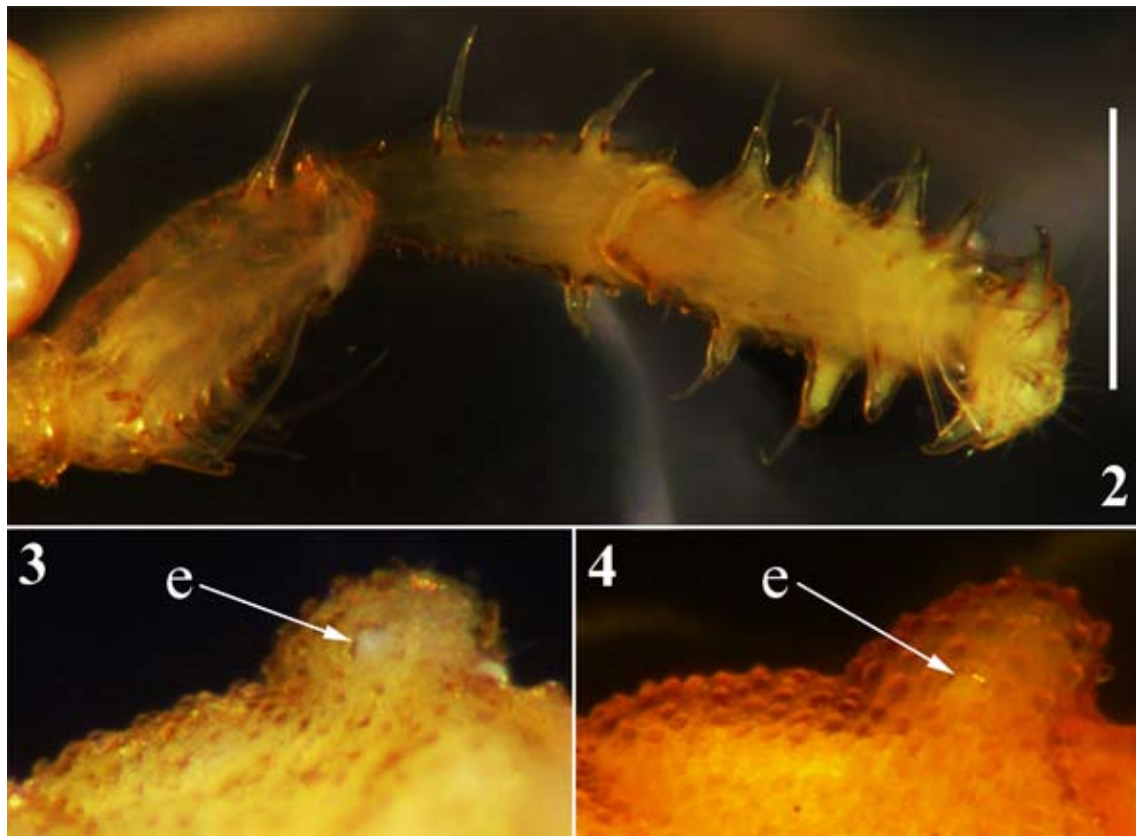
Diagnosis. Differs from *G. arganoi* that the previously known species is blind, and differs from *G. minutus* that this last species has darkly pigmented eyes. It is similar to *G. vallensis* in the unpigmented and reduced eyes (Figs. 3, 4). It differs by number, shape and position of the setae in truncus and shape of parastylar lobes. *Guerrobunus franckei* has 5 pairs of lateral microsetae, distal pair of ventrolateral setae level with basal pair of ventromedial setae, glans width uniform and parastylar lobes rounded, distally blunt (Figs. 5-10).

Description of the male holotype: measurements: *scutum* length: 1.53, *scutum* width: 0.12. Dorsum: *scutum* piriform, posterior margin straight. Finely granulate, entire dorsum covered by small rounded tubercles; boundaries between dorsal areas inconspicuous. Ocularium conical, base semi-circular, low, with small and unpigmented eyes. Ornamentation of free tergites similar to the dorsum (Figs. 1, 3). Venter: covered uniformly by small tubercles, coxae I with 2 spiniform tubercles. Projections on maxillary lobes of coxae II small, spiniform. Genital operculum wide, semicircular, anterior margin concave.

Free sternites covered with small tubercles. Chelicerae: small, without *bulla*, with 5 small uniform teeth. Pedipalps: measurements: 0.86/0.46/0.60/0.40. Femora slightly compressed, with ventral row of 5 spiniform setiferous tubercles, spiniform tubercle mesodistal present and developed. Patellae cylindrical, with 2 tubercles at mesal side, 1 basal and the other distal; ectal side with only 1 distal tubercle. Tibiae with 4 mesal setiferous tubercles and 3 at the other side. Tarsus with 3 mesal setiferous tubercles and 2 ectal tubercles. Pedipalpal claws shorter than tarsus (Fig. 2). Legs: measurements: I: 1.10/0.40/0.83/0.76, II: 1.53/0.53/1.41/1.16, III: 1.33/0.36/1.00/1.06, IV: 1.50/0.50/1.16/1.46. All serially homologous segments similar in proportions and ornamentation, covered by small setae and small rounded tubercles. Tarsal count: 3(2):4(2):5:5. Genitalia: truncus with 2 distal apophyses, blade-shaped (Fig. 5). Ventromedial setae between apophyses, arranged in 2 vertical rows with 5 setae each one, the fifth pair (distal) level with the fourth; 3 pairs of ventro-lateral setae close to basal pair of ventromedial setae, basal pair shorter than the others (Fig. 7). Three pairs of dorsolateral setae in a vertical row, basal pair slightly shorter than the rest, distal pair in dorso-lateral position with respect to glans base (Fig. 5). 5 pairs of



Figure 1. Habitus, dorsolateral view of the male holotype of *Guerrobunus franckei* sp. nov. Scale: 1 mm.



Figures 2-4. *Guerrobunus franckei* sp. nov. male holotype and *G. vallensis*. 2, *G. franckei* right pedipalp, ventral view; 3, *G. franckei* ocularium, lateral view; 4, *G. vallensis*, ocularium, lateral view. e= eye. Scale: 0.45 mm.

lateral microsetae, 3 of these slightly displaced ventrally (Fig. 6). Glans width uniform along the entire length, parastylar lobes rounded, distally blunt, *stylus* hidden between parastylar lobes (Fig. 6). Color: all dorsum and venter reddish yellow, legs slightly clearer (Fig. 1).

Female paratype: very similar to male, but differs in the smaller size of the genital operculum.

Distribution: only known from the type locality (Fig. 11).

Taxonomic summary

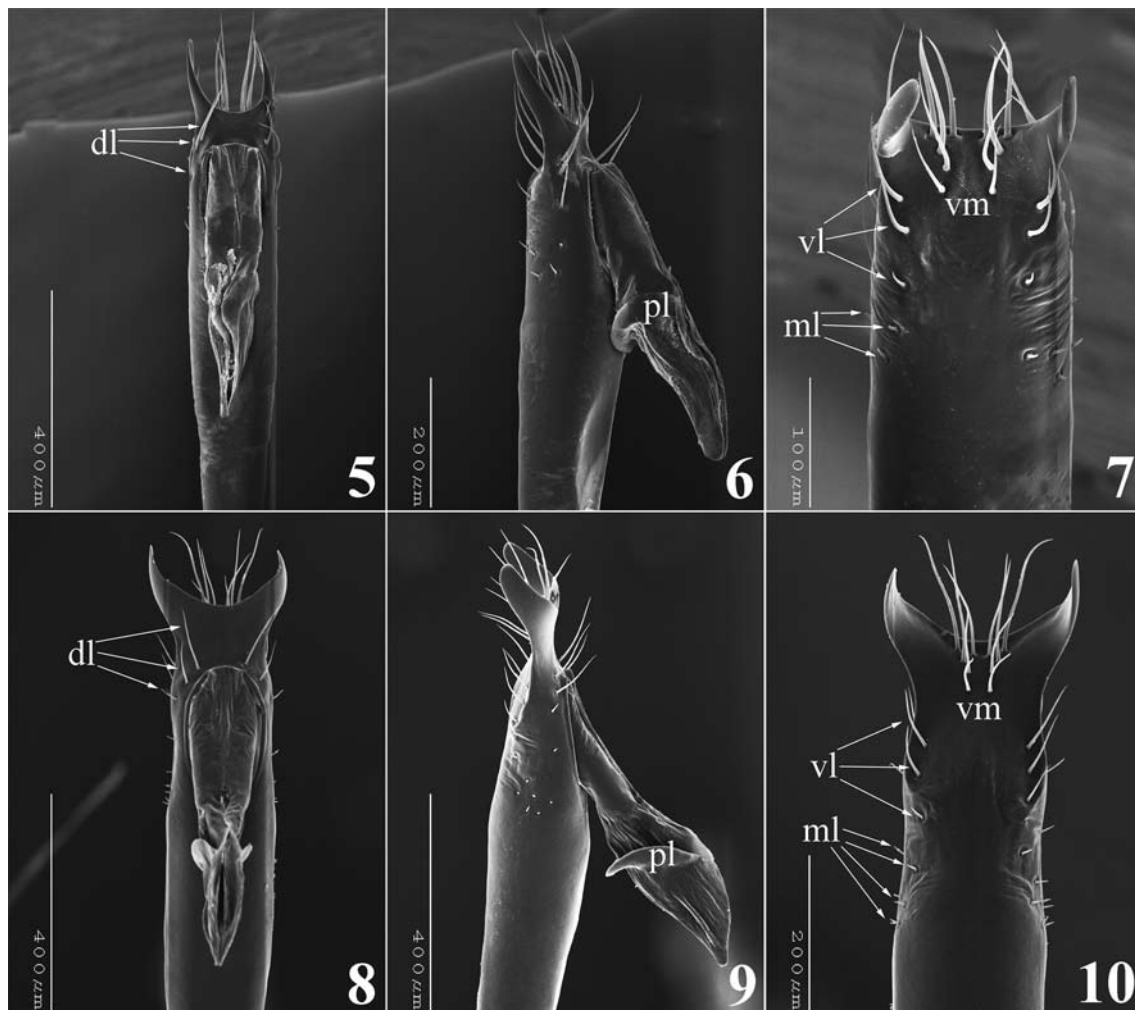
Type data: male holotype (CNAN-T0747) from cueva arriba del resumidero “La Joya” (18°35'51.683” N, 99°33'38.484” W), 1 721 m. Municipio de Taxco de Alarcón, Guerrero, Mexico. April 22-2012 (G. Contreras, J. Mendoza, R. Monjaraz and D. Ortiz coll.). One female paratype (CNAN-T0748), same locality and data.

Guerrobunus vallensis Vázquez and Cokendolpher, 1997. Male holotype and female paratype (CNAN-T0111) from cueva del Diablo (19°12'02.484” N, 100°08'29.327” W), 1 885 m. Municipio de Valle de Bravo, Estado de México, Mexico. April 25-1990 (I. Vázquez coll.). 13

males and 12 females (CNAN topotypes) same locality, August 27 2011 (A. Valdez, D. Barrales, E. Miranda, J. Mendoza and R. Monjaraz coll.).

Etymology. Species dedicated to Dr. Oscar Francke, for his many contributions to the knowledge of Mexican arachnids.

Remarks. *Guerrobunus franckei* sp. nov. and *G. vallensis* are quite similar in external appearance. This similarity is enhanced due to troglomorphic convergence in the cave habitats they occupy, such as reduction of eye size and elongation of appendages (legs). *Guerrobunus minutus*, with pigmented eyes, also has shorter legs than the other species, while *G. arganoi* with lack of eyes has proportionately longer legs. *G. franckei* and *G. vallensis* are very similar in leg length: I: 3.19, II: 4.85, III: 3.95, IV: 4.82, and I: 3.14, II: 3.84, III: 3.42, IV: 4.42, respectively, also both have eyes unpigmented (Table 1, Figs. 3, 4). However, they differ in male genitalia: size and position of ventromedial setae, distal pair of these and distance between them; distance between basal pair of ventromedial setae and distal pair of ventrolateral setae; size of basal



Figures 5-10. Male genitalia of *Guerrobunus franckei* sp. nov. and *G. vallensis*. 5-7: *G. franckei*; 5, dorsal view; 6, lateral view; 7, ventral view. 8-10: *G. vallensis*; 8, dorsal view; 9, lateral view; 10, ventral view. Abbreviations: dl= dorsolateral setae, ml= lateral microsetae, pl= parastylar lobes, vl= ventrolateral setae and vm= ventromedial setae.

Table 1. Measurements (mm) of legs of the species of *Guerrobunus*. Measurements of *G. arganoi*, *G. minutus* and *G. vallensis* taken from Vázquez and Cokendolpher (1997)

| Species | Scutum length | Leg I | Leg II | Leg III | Leg IV |
|-----------------------------|---------------|-------|--------|---------|--------|
| <i>G. arganoi</i> | 1.90 | 4.20 | 6.70 | 4.50 | 6.40 |
| <i>G. franckei</i> sp. nov. | 1.53 | 3.19 | 4.85 | 3.95 | 4.82 |
| <i>G. minutus</i> | 1.06 | 2.20 | 3.62 | 2.50 | 3.60 |
| <i>G. vallensis</i> | 1.80 | 3.14 | 3.84 | 3.42 | 4.42 |

pair of dorsolateral setae; number and position of lateral microsetae; shape of glans apex and shape of parastylar lobes (Figs. 3-10).

The 4 species of this genus are quite uniform in external morphology, aside from the troglomorphisms

mentioned above. In this genus male genitalia characters proved to be useful to distinguish both troglitic species. Unfortunately the male genitalia have not been described in detail for *G. arganoi* and are completely unknown in *G. minutus*.

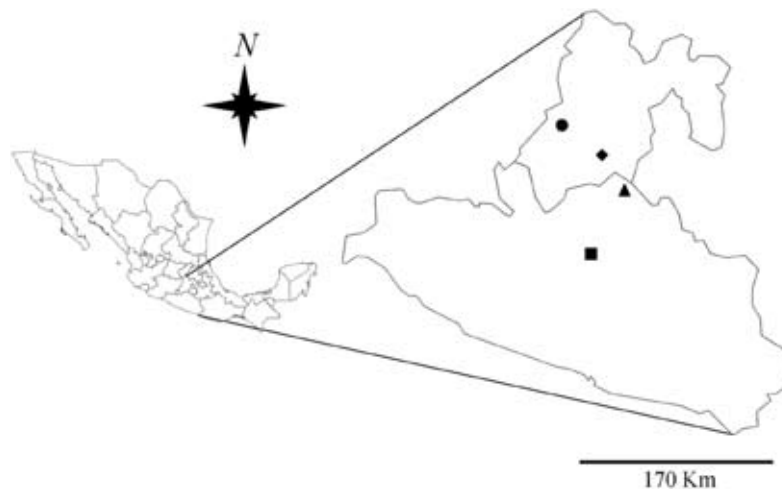


Figure 11. Distribution map of the species of the genus *Guerrobunus*. Guerrero and Estado de México enlarged. Circle: *G. vallensis*; diamond: *G. arganoi*; triangle: *G. francke sp. nov.*; square: *G. minutus*.

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Literature cited

- Briggs, T. S. and D. Ubick. 1989. The harvestman family Phalangodidae. 2. The new genus *Microcina* (Opiliones, Laniatores). *The Journal of Arachnology* 17:207-220.
- Bonet, F. 1971. Espeleología de la región de Cacahuamilpa, Guerrero. *Boletín del Instituto de Geología, UNAM* 90:1-98.
- Francke, O. F. 2009. A new species of *Alacran* (Scorpiones: Typhlochactidae) from a cave in Oaxaca, Mexico. *Zootaxa* 2222:46-56.
- Hedin, M. and S. M. Thomas. 2010. Molecular systematics of eastern North American Phalangodidae (Arachnida: Opiliones: Laniatores), demonstrating convergent morphological evolution in caves. *Molecular Phylogenetics and Evolution* 54:107-121.
- Kury, A. B. 2003. Annotated catalogue of the Laniatores of the New World (Arachnida, Opiliones). *Revista Ibérica de Aracnología, Vol. Especial monográfico* 1. 339 p.
- Kury, A. B., and J. C. Cokendolpher. 2000. Opiliones. In *Biodiversidad, taxonomía y biogeografía de artrópodos de México: hacia una síntesis de su conocimiento, Vol. II*, J. Llorente-Bousquets, E. González-Soriano y N. Papavero (eds.). Conabio, México, D. F. p. 137-157.
- Sprouse, P. and T. T. Sprouse. 1985. Association for Mexican cave studies (AMCS). *Activities newsletter*. Number 15. 97 p.
- Ubick, D. 2007. Phalangodidae. In *Harvestmen, the biology of Opiliones*, R. Pinto-da-Rocha, G. Machado and G. Giribet (eds.). Harvard University Press, Cambridge and London. p. 217-221.
- Ubick, D. and T. S. Briggs. 1989. The harvestman family Phalangodidae. 1. The new genus *Calicina*, with notes on *Sitalcina* (Opiliones: Laniatores). *Proceedings of the California Academy of Sciences* 46:95-136.
- Ubick, D. and T. S. Briggs. 2002. The harvestman family Phalangodidae. 4. A review of the genus *Banksula* (Opiliones, Laniatores). *The Journal of Arachnology* 30:435-451.
- Ubick, D. and T. S. Briggs. 2008. The harvestman family Phalangodidae. 6. Revision of the *Sitalcina* complex (Opiliones: Laniatores). *Proceedings of the California Academy of Sciences* 59:1-108.
- Vázquez, I. M. and J. C. Cokendolpher. 1997. *Guerrobunus vallensis*, a new species of harvestman (Opiliones: Phalangodidae), from a cave in Valle de Bravo, State of Mexico, Mexico. *The Journal of Arachnology* 25:257-261.