

Description of a new species of the genus *Potosa* Goodnight & Goodnight, 1947 (Opiliones: Laniatores: Stygnopsidae: Karosinae) from Hidalgo, Mexico

Descripción de una nueva especie del género *Potosa* Goodnight & Goodnight, 1947 (Opiliones: Laniatores: Stygnopsidae: Karosinae) procedente de Hidalgo, México



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ABSTRACT. *Potosa pisaflora* **sp. nov.** is described based on specimens collected from Cueva del Caracol, Pisaflora, Hidalgo, Mexico. This is the fourth species of the genus and only the second in which females have been collected. The new species is similar to *Potosa dybasi* Goodnight & Goodnight, 1947, but it can be recognized by the high number of tarsomeres on legs II and the general shape of male genitalia.

Key words: Gonyleptoidea; troglophilic; taxonomy

RESUMEN. Se describe a *Potosa pisaflares* **sp. nov.** proveniente de material recolectado en la Cueva del Caracol, Pisaflares, Hidalgo, México. Esta es la cuarta especie del género y la segunda donde las hembras son conocidas. La especie nueva es similar a *Potosa dybasi* Goodnight & Goodnight, 1947, pero puede ser reconocida por el elevado número de tarsómeros de las patas II, así como por la forma general de los genitales masculinos.

Palabras clave: Gonyleptoidea; troglófilico; taxonomía

INTRODUCTION

The family Stynopsidae Sørensen, 1932, currently contains 26 genera and 76 described species, distributed mainly in Mexico. The family is composed by two subfamilies: Stygnopsinae Sørensen, 1932 and Karosinae Cruz-López & Francke, 2017, the latter with nine genera and 28 species (Cruz-López, 2021; Cruz-López & Francke, 2015, 2017, 2019b, 2020).

Among karosine harvestmen, the genus *Potosa* Goodnight & Goodnight, 1947 is one of the most enigmatic taxa. It comprises three species; females are known only in *Potosa reddelli* Cruz-López & Francke, 2015. Its geographical distribution spans approximately 40 Km in the central portion of the Huasteca Region, between San Luis Potosí and Hidalgo states, Mexico. Members of this genus are distinguished by the synapomorphy of presence of ventral glandular opening in the middle portion of swollen metatarsus I in males (Cruz-López & Francke, 2015; Cruz-López, 2018).

The taxonomic history of the genus, although brief, has been inconstant over the years, going from being part of the Phalangodidae, later considered a synonym of the genus *Karos* Goodnight & Goodnight, 1944, and finally transferred to its current family placement within Stygnopsidae, until its revalidation and current taxonomic position (Goodnight & Goodnight, 1953; Cruz-López & Francke, 2015; Cruz-López, 2018).

Between 2011 and 2015, Cruz-López (2018) conducted several field trips to collect fresh material of the type species, as well as additional material of *Potosa elsanto* Cruz-López, 2018 in their respective localities where both species had been reported. Despite this, only two males of *P. elsanto* were collected during this period, demonstrating that this group is one of the most difficult to obtain in the field using conventional methods for harvestmen studies.

During the revision of the Opiliones deposited at Collection of Arachnology (CARCIB), from the Centro de Investigaciones Biológicas del Noreste, S. C. (CIBNOR), I found a vial with two males and one female of a new species of *Potosa*, which is described herein.

MATERIALS AND METHODS

Types are deposited at CARCIB, CIBNOR, La Paz, Baja California Sur, Mexico. Photographs were taken using a Color CMOS C-Mount Microscope Camera attached to a Jewelry Zoom Stereo Microscope, using the software AmScope v. 3.1. Male genitalia photos were taken using the same camera but attached to compound microscope Iroscope U-THC. Photographs at different depths were staged using the software Helicon Focus v. 6.7.1., male genitalia drawings were handmade, later vectorized using Concepts App for IOS v. 5.8.7. Morphological nomenclature follows Cruz-López & Francke (2015, 2017), dorsal scutum nomenclature according to Kury & Medrano (2016), pedipalpal armature follows Acosta *et al.* (2007), and macrosetal nomenclature of male genitalia according to Kury & Villarreal (2015), with specific modifications to Stygnopsidae proposed by Cruz-López & Francke (2017).

RESULTS

***Potosa pisaflares* Cruz-López, sp. nov.**

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(Figs. 1–3)

Type locality: Mexico: Hidalgo, municipality of Pisaflares, Cueva del Caracol, 1.5 Km SE from El Caracol (21.2083°N, -98.9558°W, 880 masl).

Type material. Male holotype (CARCIB-Op-H-0001) with red label: Mexico: Hidalgo, municipality of Pisaflares, Cueva del Caracol, 1.5 Km SE from El Caracol (21.2083°N, -98.9558°W, 880 masl), May 25, 2018, Cols. A. Valdéz, P. Solís, A. Cabrera, J. Valerdi and I. Navarro. Male and female paratypes (CARCIB-Op-Pa-0001) with yellow label, with the same data as the holotype.

Etymology. Toponymic in reference to the municipality where this species was collected.

Diagnosis. *Potosa pisaflares* sp. nov., is recognizable by: ocularium with sharp medium spine (Fig. 1), distitarsus II of leg II with similar length as the distitarsus I, leg II with 7/8 tarsomeres (Fig. 2B), femur IV straight and not swollen apically, base of *pars distalis* swollen in a dorsoventral view, and presence of two pairs of additional macrosetae E (Fig 3).



Figure 1. Habitus of *Potosa pisaflares* sp. nov. (A) and (B) dorsal and lateral, holotype; (C) dorsal female paratype. Scale bar: 1.5 mm for all figures.

Description. (Male holotype CARCIB-Op-H-0001). Scutum length: 3.0 mm. Scutum width in the middle portion: 2.5 mm. Color reddish yellow in 80% alcohol, uniform throughout the entire body, tarsi lighter.

Dorsal scutum (Fig 1). Gamma type, with median bulge swelling, well-marked, covering almost the entire length of the lateral margins. Constriction I rounded and deep, constriction II softly marked, contiguous with the coda. The central portion of lateral margins at level of mesotergal area I with the presence of a pair of rounded lateral clear areas, just over the area of lateral channels. Prosoma rectangular shape, slightly wider at the level of ozopores. Ocularium in the middle of prosoma, small, triangular shaped, with an apical spine about 1.5 times higher than the

ocularium, tip slightly pointing backward. Frontal bulge of prosoma barely developed. Mesotergum with five areas, boundaries between them shallow. Area I larger than the rest, areas II, III, and IV with similar size. Area I with a transversal row of few small spiniform tubercles, forming an irregular row. Mesotergal areas II and III with a transversal row of few spiniform tubercles, the central ones prominent, with the middle tubercle of the area III the most prominent. Mesotergal area IV with only a transversal row of few tubercles. Free tergites with a transversal row of spiniform tubercles, similar to those on the dorsum; lateral apices with rounded clear lateral areas, similar to those on the middle portion of lateral channels.

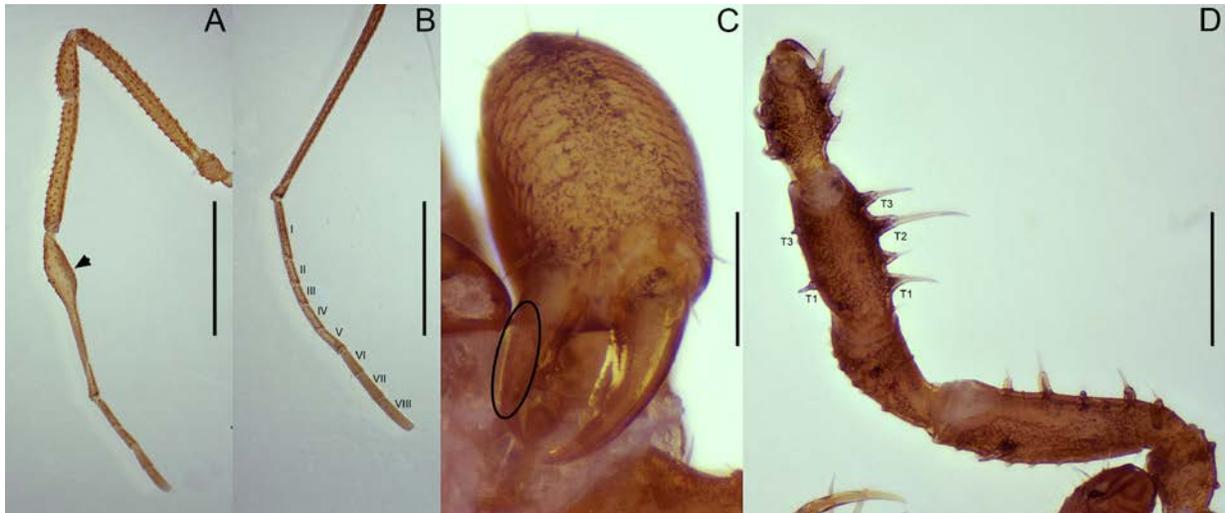


Figure 2. Legs, chelicera and pedipalp of male paratype of *Potosa pisaflora* sp. nov. (A) retrolateral view of leg I, (B) retrolateral view of metatarsus and tarsus II, (C) frontoventral view of chelicera, (D) ventromesal view of pedipalp. Arrow on (A) indicates the ventral glandular opening. Roman numerals in (B) indicates the number of each tarsomere. Ellipse in (C) indicates the cheliceral comb. T1-T3 on (D) indicate the major setiferous tubercles on tibia. Scale bars: (A) = 2.0 mm, (B) = 1.5 mm, (C) = 0.5 mm, (D) = 1.0 mm.

Chelicera (Fig. 2C). Sexually monomorphic, small, bulla beak, fixed cheliceral finger with two small teeth in the middle, movable finger with two irregular median teeth. Fixed finger with ventral comb.

Pedipalp (Fig. 2D). Femur rectangular in cross section, slightly curved; ventrally with a row of five spiniform setiferous tubercles, the two basalmost being larger than the rest. Femur with a long setiferous tubercle in the meso-apical surface. Patella cylindrical, with few and small tubercles dorsally; with two long setiferous tubercles on mesal face. Mesal face of tibia with the three typical setiferous tubercles (T1-T3), between T1 and T2, with additional short setiferous tubercles as follows $3 > 1 = 4 > 2$; ectal margin with only two major setiferous tubercles, T1 and T3: ii (1=2). Tarsus with three setiferous tubercles on both margins. Pedipalpal claw shorter than the tarsus.

Legs (Figs. 2A, B). All legs are slender and covered by small tubercles not arranged in rows, tubercles present from trochanters to metatarsi. Tarsi covered only by small setae. Metatarsus I swollen at the base, with the typical glandular opening in the middle, dome-shaped. Distitarsus I-III (tarsal segments VI-VIII) similar in size, not swollen, distitarsus II slightly longer than I, and disitarsus III slightly longer than II. Femur IV covered by small spiniform tubercles, slightly pronounced on the ventral side, not forming rows; femur slightly curved in the middle. Tarsal count: 4(2):7/8(3):6:6.

Penis (Fig. 3). *Pars distalis* flattened dorsoventrally, apical portion of the *flimsy lamina* slightly rolled ventrally, with the margin slightly dentate near the apices; at the base, the *pars distalis* is

swollen, at level of the macrosetae A. The *follis* is exposed, originates from the middle of *pars distalis*, at level of the macrosetae C3. *Follis* long, apically with two lateral lobes, interno-apical surface of it covered by minute spiniform projections. *Stylus* originated from the internal *follis* and with apical bristles. With three pairs (C2 absent on one side) of macrosetae C located laterally on the *pars distalis*, at the same level at the *follis*. With a pair of macrosetae A in the basalmost portion of *par distalis*, just on the swollen area. Two pairs of macrosetae D located at the lateral sides of the *follis*, in a longitudinal axis respect to the penis. With four pairs of small macrosetae E, the typical E1 (absent on one side) and E2 located as follows: E1 between C1 and the apical margin; and E2 between C1 and C2. Additional macrosetae E3 between C2 and C3 and, the basalmost pair E4 in the swollen portion, at the same level of the macrosetae A.

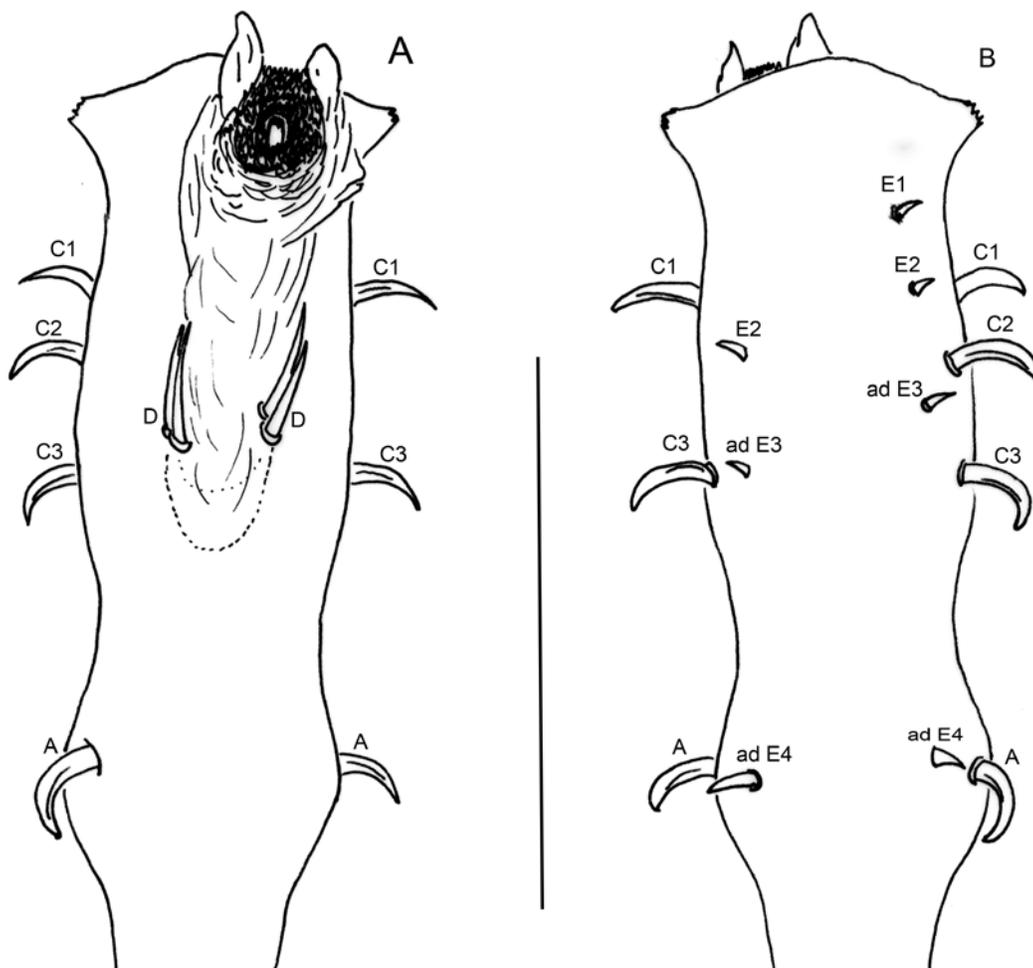


Figure 3. Penis of male paratype of *Potosa pisaflores* **sp. nov.** (A) dorsal, (B) ventral. Macrosetal groups are indicate on each figure. Scale bar: 0.1 mm for both figures.

Female (Fig. 1C). The unique specimen is very similar to the male, with the absence of the ventral glandular opening on metatarsus I. Tarsal count: 4(2):8(3):6:6.

Natural history. The specimens were collected under rocks, in the middle section of the cave (Fig. 4B).

Geographical distribution. This species is endemic, only known from the type locality (Fig. 4).



Figure 4. (A) Panoramic view from the entrance of the Cueva del Caracol. (B) Photo of entrance of the cave from the first 50 meters inside. Both photographs courtesy of A. Valdéz-Mondragón.

DISCUSSION

Although only eight male specimens are known of the genus, it is interesting that they exhibit irregularities or asymmetries in the number of pairs of penial macrosetae. In the case of *P. pisaflorae* **sp. nov.**, there are incomplete pairs of macrosetae C2 and E1. The remaining species also exhibit incomplete pairs, which are not due fractures or breaks during handling of the male genitalia. This condition is not common in other stygnopsids, are not even reported frequently among Laniatores. The presence of sexually dimorphic glandular openings on legs in Laniatores is generally related to intraspecific chemical communication; however, in the great majority of species that possess

them, the behavior mechanisms are unknown (Willemart *et al.*, 2010). These kinds of glandular openings generally are associated with some enlarged or swollen portion on some segments of legs. Among stygnopsid harvestmen, a few genera have some portions of their legs enlarged, suggesting that there are possible glandular openings in the respective segments. In addition to *Potosa*, two genera with modifications are *Mexotroglinus* Šilhavý, 1977 and *Huasteca* Cruz-López & Francke, 2015, with apical tibia II, and patella with basal tibia II swollen, respectively. Cruz-López & Francke (2017, 2019a), showed that those modifications on *Mexotroglinus* and *Huasteca* are not associated with any kind of glandular opening, and it is possible that they are not related with chemical communication.

As mentioned above, *Potosa* is the most enigmatic genus of the family, with very few specimens of the four species known. However, they can be easily recognized and diagnosed from each other, and identification key is provided below.

Updated key to the species of *Potosa* based on males, modified from Cruz-López (2018)

1. Ocularium without medium spine *Potosa redelli* Cruz-López & Francke, 2015
- 1'. Ocularium with medium spine **2**
2. Distitarsus II of leg II noticeably longer than distitarsus I *P. elsanto* Cruz-López, 2018
- 2' Distitarsus II of leg II with similar length as distitarsus I **3**
3. Leg II with 7/8 tarsomeres, base of *pars distalis* swollen, with two pairs of additional macrosetae
E *Potosa pisaflares* **sp. nov.**
- 3'. Leg II with 5 tarsomeres, base of *pars distalis* not swollen, with one pair of additional macrosetae
E *P. dybasi* Goodnight & Goodnight, 1947

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