

NEW CAVE COLLEMBOLA FROM MEXICO AND BELIZE¹José G. Palacios-Vargas² and Jean-Marc Thibaud³

ABSTRACT

Two new species of cave Collembola, one from each of the genera *Typhlogastrura* Bonet (Hypogastruridae) and *Trogolaphysa* Mills (Paronellidae), the first from Mexico and the second from Belize, are described, illustrated and compared with their closest relatives. An additional new record of *Heteromurus nitidus* (Templeton) from a Mexican cave is given, and a record for *Trogolaphysa* sp. from Guatemala is included.

INTRODUCTION

Few papers dealing with Collembola from Neotropical caves have appeared since the contribution of Palacios-Vargas (1989). The most recent species comprehensive work is on the genus *Arrhopalites* Börner (Palacios-Vargas & Zeppelini, 1995) which is very widely distributed in the area with several species being highly adapted to cavernicolous life.

The genus *Typhlogastrura* is distributed mainly in the Palearctic Region, with 12 known species, plus the new one herein described. The genus was revised by Thibaud (1980). Most of the species live in caves. As far as known, their distribution extends to the midnorthern part of Mexico. *Trogolaphysa* now includes 23 described species from the Neotropical Region (cf. Palacios Vargas et al. 1985, Thibaud & Najt 1988, Yoshii 1988). Nine species occur in Mexico below latitude 20° North. This is one of the most interesting genera of Collembola because of their adaptations (troglomorphs) to cave life, but there are still several species with eyes and pigment well developed in such environments and others that dwell on the surface.

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In this paper, we have studied some material from caves that were loaned to us by Dr. Kenneth A. Christiansen (Grinnell College, Iowa, USA). There are two new species, one from each of the genera *Typhlogastrura* (Hypogastruridae) and *Trogolaphysa* (Paronellidae). Both species are interesting because of their morphological adaptations unique to the genera. Additional records for another species in the region also are given.

Typhlogastrura Bonet, 1930

Species in the genus usually lack pigment; eyes reduced or absent; postantennal organ with 3-11 tubercles arranged in a circle; antennal segment IV with 5 - 17 sensilla, an apical simple, bi- or trilobulate bulb; unguis long and thin, with an internal tooth, unguiculus with basal lamella and filament about $\frac{1}{2}$ length of unguis; tenaculum with generally 4+4 teeth; furca well developed, dentes with usually 7-8 setae, mucro type *armata* and long anal spines. Chaetotaxy type A (Thibaud, 1980): on meso- and metathorax seta p2 is in position m2, and on abdominal tergite IV p1 is a microseta and p2 is a macroseta.

Typhlogastrura elsarzolae sp. nov.

(Figs. 1 - 7)

DESCRIPTION: Length (n=2): 1.5 mm. (1.35 - 1.67). Color in alcohol white. Ocular area without any pigmentation. All dorsal setae slightly crenulate (Fig. 1). Ratio head: antenna= 1.0: 1.4. Ant. I with 7 setae; Ant. II with 13 setae; Ant. III with 18 setae, 2 guard sensillae, two microsensilla and one ventral microsensillum. Ant. IV with 9 sensilla, one microsensillum and one subapical sensorial organ; subapical bulb simple (Fig. 2). With 1+1 cornulae. Ocular area with only two setae. Postantennal organ with 5-6 vesicles (Fig. 3). Tibiotarsus III with 18 setae. Unguis as typical for the genus, with a median tooth and two basal teeth; one small external tooth also present (Fig. 4). Ratio unguis III: dens = 1.3. Unguiculus with basal lamella and its filament about $\frac{3}{5}$ length of unguis. Ventral tube with 4 + 4 setae. Tenaculum with 4 + 4 teeth. Dens about 48 μ m, with seven setae (Fig.5). Mucro about 20 μ m, spoon like. Ratio dens: mucro as 2.4. Anal spines 75 μ m, about 1.1 length of unguis III, on separate papillae (Figs. 1 and 7). Female genital plate with 8 circumgenital pairs of setae and 2 eugenital setae (Fig. 6).

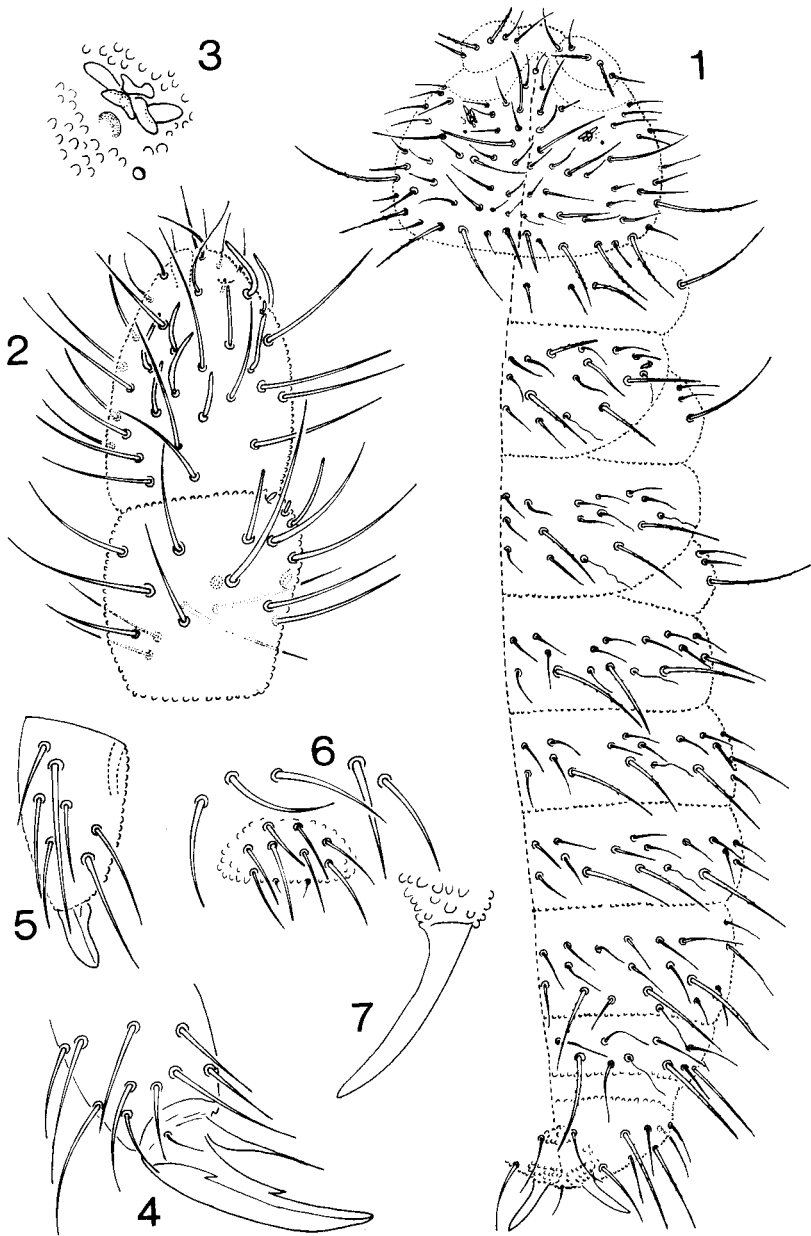
The chaetotaxy of the head, thorax and abdomen is illustrated in Fig. 1.

VARIATION: Some asymmetries of chaetotaxy were observed such as setae p1 lacking on one side of Th. I of one specimen. One specimen lacks the eye and postantennal organ on one side.

ETYMOLOGY: This species is dedicated to Lic. Elsa del Carmen ARZOLA for her help on this project.

TYPE MATERIAL: The holotype female will be deposited in the Collembola collection (Cat. 1968) of the Laboratorio de Ecología y Sistemática de Microartrópodos; paratype female will be kept at the Laboratoire d'Entomologie, Paris.

TYPE LOCALITY: MEXICO: Nuevo León: Pozo Primero de Septiembre, 21-XI-1993, P. Sprouse Col.



FIGS. 1-7. *Typhlogastrura elsarzolae* sp. nov. 1, dorsal chaetotaxy; 2, antennal segments III and IV, dorsal view; 3, postantennal organ, accessory boss and corneula; 4, apex of tibiotarsus III, unguis and unguiculus; 5, dens and mucro; 6, genital plate of female; 7, anal spine.

DISCUSSION: This is the second species of *Typhlogastrura* known from Mexico, the first. *T. veracruzana* Palacios-Vargas & Thibaud (1985) was described from a cave from Veracruz State.

T. elsarzolae differs from *T. veracruzana* in having only 9 sensilla on Ant. IV (vs. 11 - 14), apical bulb simple (vs. trilobulate), and having only 7 dental setae. The new species has one corneula on each side of the head. *T. veracruzana* generally has no corneula, however when one is present, it is in a different position as illustrated by Palacios-Vargas & Thibaud (1985).

Trogolaphysa Mills, 1938

Diagnosis (after Thibaud & Najt, 1988). Entomobryomorph. With or without pigment. Without postantennal organ. Eyes reduced or completely absent. Two pairs of trichobothria on the head (only one illustrated on Fig. 8) and 2-3, 3, 3 pairs on Abd. II-IV. With setae and scales. Tenent hair capitate, clavate or acuminate. Abdominal segment IV four times the length of Abd. III. Dens with 1-2 rows of ciliate spines. Mucro with 3-5 teeth. Ant. IV may be annulate, but never subdivided in two subsegments. Labial triangle with five anterior smooth setae and a posterior row with setae M1, M2/m2. r, L1/l1, L2. Most of the species known from caves.

Trogolaphysa belizeana sp. nov.

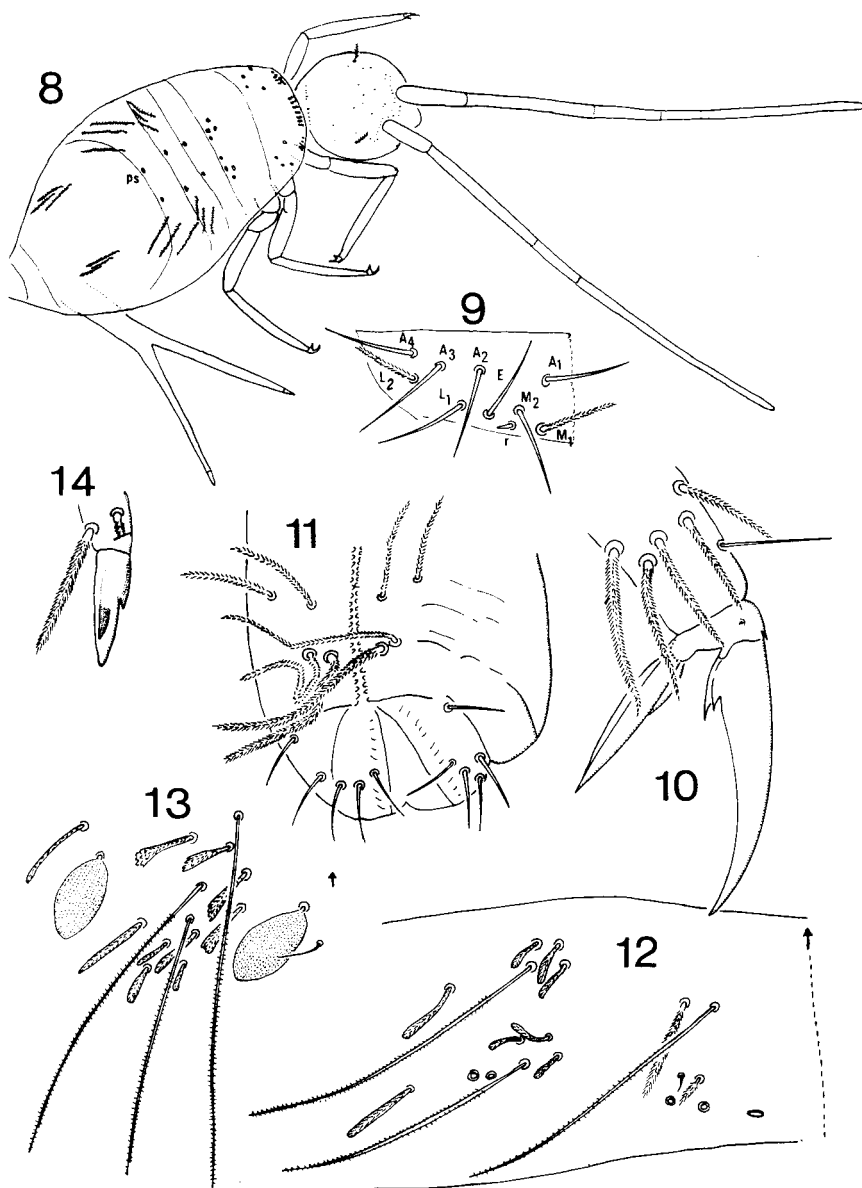
(Figs. 8-14)

DESCRIPTION: Length at most 2.6 mm; without any pigmentation and eyes. Ant. I and II with scales, setae and long tubular sensilla. Base of Ant. I with 3 setae. Ant. IV with unclear annulations and without apical bulb. Ratio head: antenna = 1:4 (Fig. 8). Ratio Ant. I; II; III; IV = 1: 4; 7; 12. Labrum with 4/5,5,4 smooth setae, ventral lobes crenulate. Labium with A1 to A5 smooth, M1 and L2 ciliate, M2, E and L1 smooth, « r » reduced (Fig. 9). Legs without scales. Trochanteral organ with 18 setae. Unguis long and slender, without median tooth, only with two basal teeth and one small external tooth (Fig. 10). Unguiculus I with small serrations, II and III smooth. Pretarsal seta reduced. Tenent hair acuminate. Ratio unguis: unguiculus; tenent hair = 1: 0.62; 0.41. Ventral tube with four pairs of ciliate macrosetae and five pairs of smooth setae on anterior apex (Fig.11), posterior surface with only ciliate mesosetae. Tenaculum with 4 + 4 teeth and one setae on corpus. Ratio manubrium: dens; mucro = 1:1.5;0.12. Manubrium with setae and scales. Dens with setae, scales and two rows of spines, with about 30 each. Mucro with only 3 teeth (Fig. 14). Ratio mucro: unguis III = 1:1.8. Habitus with the trichobothria is represented in Figure 8; details of the chaetotaxy of abdominal segments II and IV are given in Figs. 12 and 13.

ETYMOLOGY: Named after Belize, the country from which it is known.

TYPE MATERIAL: Holotype female and two paratypes at Laboratorio de Ecología y Sistemática de Microartrópodos; three paratypes at Laboratoire d'Entomologie Muséum National d'Histoire Naturelle, Paris.

TYPE LOCALITY: BELIZE: Cayo; cave Actun Chapal (7 Km SE Benque Viejo del Carmen). 10-XII-1992. W. R. Elliot Col.



FIGS. 8-14. *Trogolaphysa belizeana* sp. nov. 8, habitus with trichobothria, insertion of macrosetae and position of pseudopores (ps); 9, labial chaetotaxy; 10, apex of tibiotarsus III, unguis and unguiculus; 11, apex of ventral tube, anterior view; 12, partial chaetotaxy of abdominal segment II, left side; 13, partial chaetotaxy of abdominal segment IV, left side; 14, apex of dens and mucro.

DISCUSSION: *Trogolaphysa belizeana* is close to *T. ecuatoricus* Palacios-Vargas *et al.* (1985) and *T. haiticus* (Palacios-Vargas *et al.* 1985) and *T. bessoni* Thibaud & Najt (1988). The three species share the lack of eyes, pigment, and the ventral middle tooth on the unguis. *T. belizeana* can be differentiated by the presence of three tricobothrium on abd. II. only three teeth on the mucro, by the long antenna and the presence of only M1 and L2 ciliate on the labial triangle.

The chaetotaxy of the second abdominal tergum in this species is unlike any described so far for members of this genus. In addition the presence of macrochaeta on the third thoracic tergum and the labial setae, most of which are smooth, make this a very interesting species.

Among all the blind species of *Trogolaphysa* from Central America, *T. belizeana* seems to be the most highly adapted to cave life, because of the foot complex and the length of the antenna.

Trogolaphysa sp.

There is an undescribed species with 3 corneulae on each side of the head, two of them in anterior position are very close to each other. The foot complex is not very modified, as the unguis still has a very well developed median tooth. All the posterior labial setae (except « r ») are ciliate as in *T. hondurasensis* (Palacios-Vargas *et al.* 1985).

Locality: GUATEMALA: Petén; Cave Kaxon Pec. Dos Pilas, Sagaxche. A. Cobb Col. May 1993, one specimen.

NEW RECORDS

Heteromurus nitidus (Templeton, 1835)

MEXICO: Nuevo León: La Escondida; Pozo Primero de Septiembre, 21-XI-1993, P. Sprouse Col. Six specimens.

We have compared Mexican specimens with those from Europe and have found no differences. Denis (1938) studied collections from 17 localities in Italy and found some variation in the numbers of eyes and teeth of the unguis, but considered them to be the same species with intraspecific variations. In addition, we can state that the labial triangle has setae A1 to A5 smooth and setae « r » is well developed (R); all the labial setae are smooth. Our record represents the first record of this species for Mexico.

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