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Taxonomy and systematics

First Mexican species of *Pseudachorudina* (Collembola: Neanuridae: Pseudachorutinae) from Mapimí Desert, State of Durango

Primera especie mexicana de Pseudachorudina (Collembola: Neanuridae: Pseudachorutinae) del desierto de Mapimí, estado de Durango

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Abstract

Pseudachorudina navarretei sp. nov. from Mapimí Desert, Durango, México, is described. It is similar to the American species *P. texensis* and *P. ignotus* Christiansen and Bellinger, 1980, all of them with 1 dorsal strong capitated tenent hair on tibiotarsi. It differs in the shape of the maxillary lamellae, one with 4 sharp big teeth and one semispherical with 5 stocky teeth while *P. texensis* has both lamellae toothed and similar; *P. ignotus* has only 1 serrate lamella and the maxillary capitulum is elongated. The new species has 5 long dental setae; *P. texensis* has 4 short and *P. ignotus* has 6 of different sizes.

Keywords: Chaetotaxy; Arid soil; Taxonomy; Pitfall traps

Resumen

Se describe *Pseudachorudina navarretei* sp. nov., procedente del desierto de Mapimí, Durango, México. Es similar a las especies norteamericanas *P. texensis* y *P. ignotus* Christiansen y Bellinger, 1980 por la presencia de una fuerte seda capitada dorsal en los tibiotarsos. La especie nueva difiere en la forma de las lamelas maxilares, una con 4 grandes dientes agudos y la otra semihemisférica con 5 dientes fuertes, mientras que *P. texensis* tiene ambas lamelas dentadas y similares; *P. ignotus* solo tiene 1 lamela aserrada y 1 capítulo maxilar alargado. La especie nueva tiene 5 sedas largas dentales; *P. texensis* 4 sedas cortas y *P. ignotus* 6 de diferentes tallas.

Palabras clave: Quetotaxia; Suelo árido; Taxonomía; Trampas de caída

Introduction

About 100 species of the family Neanuridae are known from Mexico (Palacios-Vargas, 2013) and more than 1,540 have been described all over the world (Bellinger et al., 2019). In this family, the members of Pseudachorutinae are represented by almost 500, with some genera very widely distributed. The specimens of Pseudachorutinae have a very variable development of furcula, number of eyes, presence of postantennal organ and mouth parts of very different shape. Mandibles are small with a few apical teeth and no molar surface; maxillae are often styliform and sometimes with well-developed lamellae with teeth or feathered. Mouth cone can be prominent with a beak shape, with an elongation of the labrum and labium. In the subfamily Neanurinae, the mouthparts were used by Cassagnau (1982) to establish the different lineages (actual tribes) according to their development and to propose a new phylogenetic model (Cassagnau, 1983). But for the Pseudachorutinae, the use of mouth parts morphology for the division of tribes proposed by Massoud (1967) has been questioned by several authors. Therefore, it is important to continue the study of members of this group from different biogeographic regions and propose the division into tribes.

Members of *Pseudachorudina* are known from several regions, but 5 out of 14 have been described from Europe; 2 species are known from the USA, and this is the first time it is recorded from Northern Mexico with a new species.

The State of Durango is located in the northern part of Mexico with 2 important biological reserves. The first one is La Michilia between 23°25' and 23°30' N, 104°15' and 104°21' W; the elevation is about 2,350 and 2,850 m with *Pinus-Quercus* forest. About 30 species of springtails have been identified from this location (Montejo Cruz pers. comm.) and were collected by Palacios-Vargas and Najt (1986) with different techniques, other were collected using pitfall traps (Terrón-Sierra & Palacios-Vargas, 1991). Mapimí Biological Reserve is in the desert of Mapimí (Palacios-Vargas & Najt, 1986) and is located close to the border between Chihuahua and Coahuila, between 26°29' and 26°52' N, 103°32' and 103°58' W. The altitude is between 1,100 and 1,350 m asl. From this desert, only 9 springtails have been included in the data base of our Collembola collection, done after the compilation of Palacios-Vargas (2013). Including the new species here described, only 40 springtails are known from Durango.

Abbreviations used in this contribution are: Ant. = antennal segment; Abd. = abdominal segment; m, microsensillum, microsensilla; or = oranite; PAO = postantennal organ; S = sensillum, sensilla; Sgd = dorsal guard sensillum; Sgv = ventral guard sensillum; Th. = thoracic segment; Tita. = tibiotarsus, tibiotarsi.

Materials and methods

Specimens were collected using pitfall traps in the Mapimí desert by Dr. Pedro Aguilar. They were preserved in 75% alcohol and donated to the author. Later, they were cleared on KOH at 10% and in warm lactophenol acid and mounted under cover slides in Hoyer's solution. The morphology was studied under a phase contrast Carl Zeiss microscope and drawings were made with the aid of a camera lucida.

Description

Collembola

Neanuridae

Pseudachorutinae

Pseudachorudina Stach, 1949

Diagnosis. Neanurids similar to *Pseudachorutes*, with strong blue pigmentation, except ventral side, furcula and legs which are less pigmented. Ant. III and IV dorsally fused, subapical vesicle present, with sensilla of normal shape and no ventral file. Ant. Organ III with 2 guard sensilla, 1 dorsal and 1 ventral; 2 microsensilla and 1 ventral microsensillum. 8+8 eyes. Postantennal organ is always present with 5 to 20 vesicles arranged in one ellipse. Mouth cone truncate, more elongated than members of *Brachystomella*, but shorter than *Pseudachorutes*. Mandible with 5-8 sharp teeth, maxilla with a median capitulum and with 2 or 3 complicated lamellae, toothed or feathered. Tibiotarsus very rare with one dorsal apical tenent hair. Unguis similar to *Pseudachorutes* with or without inner and lateral teeth; ventral tube with 4 + 4 setae, retinaculum and furcula always present and well developed; mucro with more or less coarsely granulation. Sixth abdominal segment visible in dorsal view, no anal spines.

Type species: *Pseudachorudina alpina* Stach, 1949

Pseudachorudina navarretei sp. nov. (Figs. 1-11)

<http://zoobank.org/urn:lsid:zoobank.org:act:8252351B-5EB3-42E4-B450-F1067BF9398E>

Description. Body length (n = 8) 1.1 mm. Color: very dark blue with pigment in patches of granules. Ocular patches black (Fig. 1). Most setae short almost acuminate (5-22 µm). Sensorial setae about 30 µm. Cuticle with strong granulation.

Ant. I with 7 dorsal setae, Ant. II with 12 in 2 whorls; Ant. III with 19 setae, sensorial organ with 2 short cylindrical microsensilla and 2 guard sensilla, Sgv and microsensillum far from organ. Ant. IV with 6 sensilla, 1 microsensillum, a subapical organ "or" and apical bulb trilobed (Fig. 2), no ventral file. 8+8 eyes. PAO in rosette shape, slightly bigger than one eye, with 5-8 vesicles

(Fig. 6). Ratio PAO: eye = 1.2. Labrum with 2/4,4,4 setae. Mouth cone truncate like *Brachystomella*; labium with setae A-G, but without tuberculate seta L (Fig. 7). Mandible with 3 small apical teeth and 3 bigger basal teeth (Fig. 4). Maxilla with a capitulum with 2 big teeth and 3 smaller; 2 lamellae, one with 4 sharp teeth and other with 5 thick teeth (Figs. 3, 5). Legs chaetotaxy from I to III, subcoxae with 0,1,2 setae; coxae with 3,8,8; trochanters with 6,6,6; femora with 12, 11 and 10 (1 ventral modified like a long acuminate tenent hair); Tita. with 19, 19 and 18, dorsally with 1 strong dorsal capitate tenent hair (Fig. 8). Unguis with a median tooth and no lateral teeth. Body dorsal setae almost acuminate, those posterior slightly crenulated. Head chaetotaxy in Fig. 6; Th. I-III in Fig. 10; Abd. I-VI in Fig. 9. Th. I with 3+3 dorsal setae. Sensorial setae from Th. II to Abd. V: 2,2/1,1,1,1,1. Th. II with 1 microsensillum laterally close to sensorial seta. Ventral tube with 4+4 setae, retinaculum with 3 + 3 teeth. Dens with 5 long setae. Mucro short,

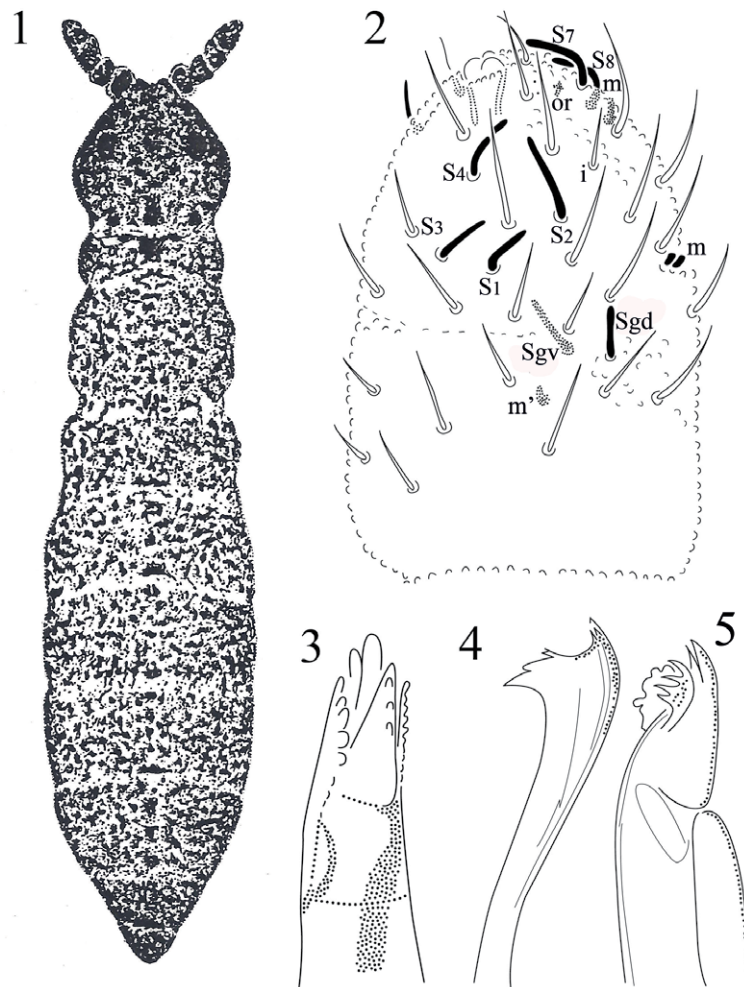
about 1/3 dens length, subtriangular, no lamellae (Fig. 11). Female genital plate with 3 + 3 pregenital setae, 10-12 circumgenital and 2 eugenital; males unknown. Anus terminal, no anal spines.

Taxonomic summary

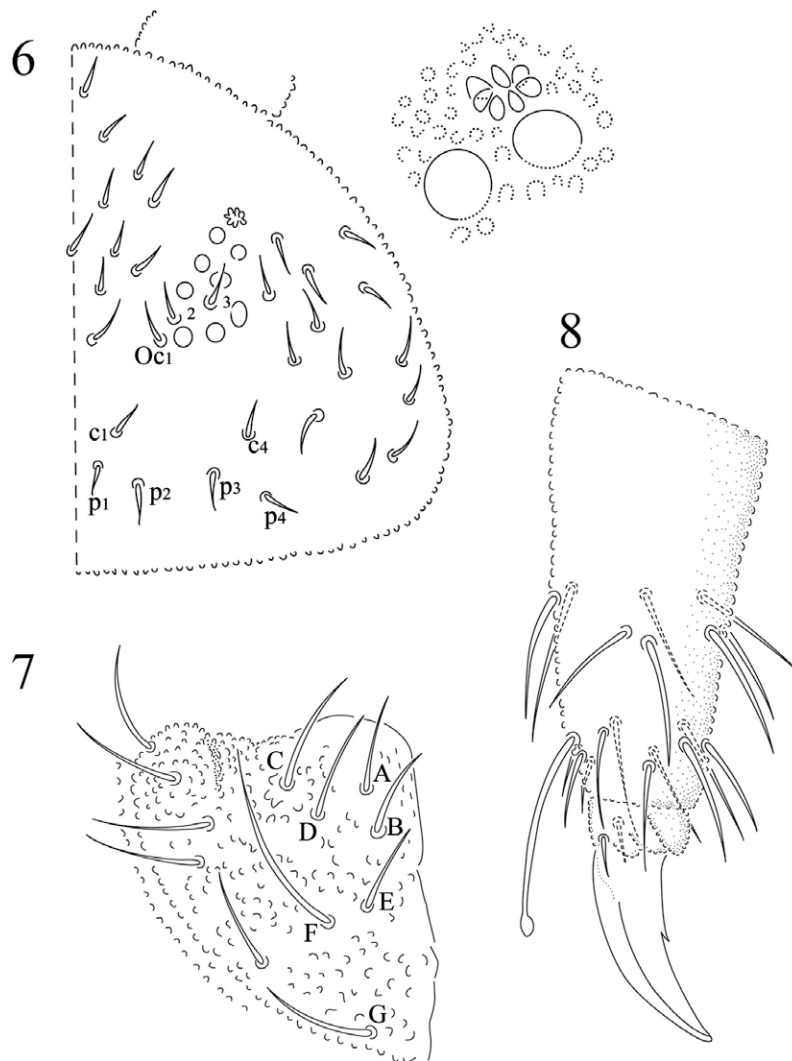
Type material: holotype female (FC UNAM 22508) under slide, 8 female paratypes under slides (Collection of Facultad de Ciencias, UNAM, slides FC UNAM from 22509 to 22516). Type material is maintained at the author's institution. Eight additional specimens under slides, from the same locality, are also kept. However, they are too transparent and damaged to represent types.

Type locality: Mexico: Durango: desierto de Mapimí, ex pitfall traps 15-VIII-1985, F. Aguilar col.

Variation: PAO with the following number of vesicles (frequency in parenthesis): 5+6 (1), 7+6 (5), 7+7 (2), 6+8 (1), 7+8 (2) in 11 specimens studied. Dens and mucro are often fused. Some dens with reduced mucro and in



Figures 1-5. *Pseudachorudina navarretei* sp. nov. 1) Habitus with pigment distribution on body; 2) Ant. III-IV chaetotaxy dorsal view; 3) maxilla, lateral view; 4) mandible, dorsal view; 5) maxilla in dorsal view.



Figures 6-8. *Pseudachorudina navarretei* sp. nov. 6) Head half dorsal chaetotaxy and magnification of PAO and proximal eyes; 7) half labium chaetotaxy; 8) Tita. and unguis III.

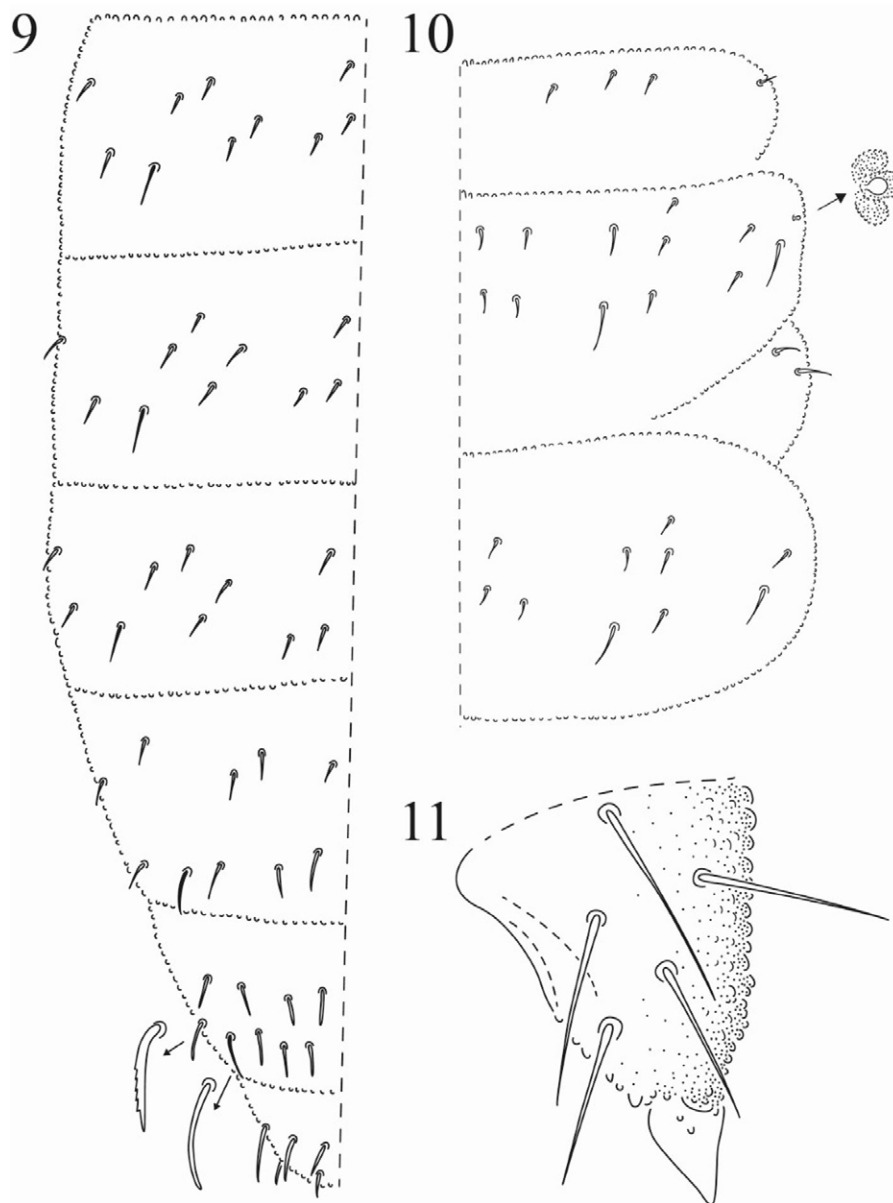
one case mucro was bifid. Some cases of chaetotaxy asymmetries were found.

Derivatio nominis: species dedicated to Dr. José Luis Navarrete Heredia, from Universidad de Guadalajara, for his enthusiasm in the organization of zoological congresses and the edition of the entomological magazine Dugesiana.

Discussion

To date, 15 species of *Pseudachorudina* are known, 7 have a maxilla with toothed lamellae (*alpina*, *berninii*, *evansi*, *ignota*, *nepalica*, *texensis* and *navarretei* sp. nov.), 4 have feathered lamellae (*angelieri*, *dahli*, *falteronensis* and *meridionalis*), and 4 species should be revised as their maxillae are not well described (*brunnea*, *mabirensis*, *osextara* and *pacifica*).

Pseudachorudina navarretei sp. nov. belongs to the group of species with toothed lamellae, and is close to *ignota* and *texensis* by the presence of 1 clearly capitate tenent hair on tibiotarsi and the presence of a reduced mucro, which is well developed in all the other members of the genus. This new species is easy to differentiate from the American members of this genus, because its maxilla has only 2 lamella; one with 4 sharp big teeth and one semispherical with 5 stocky teeth while *P. texensis* (after the figures of Christiansen and Bellinger [1980]) has both lamella toothed and similar. *P. ignotus* has only 1 lamella serrate and the maxillary capitulum is elongated. The new species has 5 long dental setae; *P. texensis* has 4 short setae and *P. ignotus* has 6, 2 basal short and the other much longer.



Figures 9-11. *Pseudachorudina navarretei* sp. nov. 9) Abdominal dorsal chaetotaxy, with magnification of one normal seta and one sensorial seta; 10) thorax dorsal chaetotaxy, with magnification of microsensillum of Th. II; 11) dens and mucro.

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