



A new species of *Denisiella* (Collembola: Sminthurididae) from Panama and new records for *D. sexpinnata* (Denis, 1938)

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Abstract

Denisiella diomedesi **sp. nov.** from Panama is described and illustrated based on male specimens. It is close to *D. maesorum* from Nicaragua, but possesses a nasal organ. New localities for *D. sexpinnata* (Denis, 1931) from Mexico and Nicaragua are provided.

Key words: *Denisiella diomedesi* n. sp., sexual dimorphisms, nasal organ

Introduction

The family Sminthurididae is composed of minute Collembola characterised by a sexual dimorphism in which the antennae of males are modified for clasping the female antennae during the sperm transfer. The modifications are on antennal segments II and III but the degree of modification varies among the different genera.

Close to 150 species have been described in the Sminthurididae in 10 genera (Bellinger *et al.* 1996-2007). Four of the genera are monospecific, *Boernerides*, *Debouttevillea*, *Sinnamarides* and *Sminthuridia*. Two genera include many described species, *Sminthurides* (62) and *Sphaeridia* (65). *Pygicornides* and *Yosiides* have two species each, *Stenacidia* has three and *Denisiella* has seven named taxa and two undescribed species.

Only the genera *Sminthurides*, *Sphaeridia*, *Denisiella* and *Sinnamarides* are known from the Neotropical Region with 11, 14, four and one species respectively. The collembolan fauna of Panama is very poorly known (Palacios-Vargas 1992), and only recent field work by Castaño-Meneses *et al.* (2006) has provided useful material from this country.

The seven species of *Denisiella* known from the world are, *D. lithophila* Snider, 1988, *D. maesorum* Palacios-Vargas, 1995; *D. nayarita* Palacios-Vargas & Bernava, 1999; *D. ramosa* (Folsom, 1932), *D. seurati* (Denis, 1925), *D. serroseta* (Börner, 1908) and *D. sexpinnata* (Denis, 1931).

In this paper a new species of *Denisiella* is described based on male specimens collected by B. Zachrisson and kindly given to me by Dr. Gabriela Castaño-Meneses. The new species is of interest because of the presence of characters that have not before been found in the genus and so will contribute to future studies examining the phylogenetic relationships between genera of Symphypleona.

***Denisiella* Folsom & Mills, 1938**

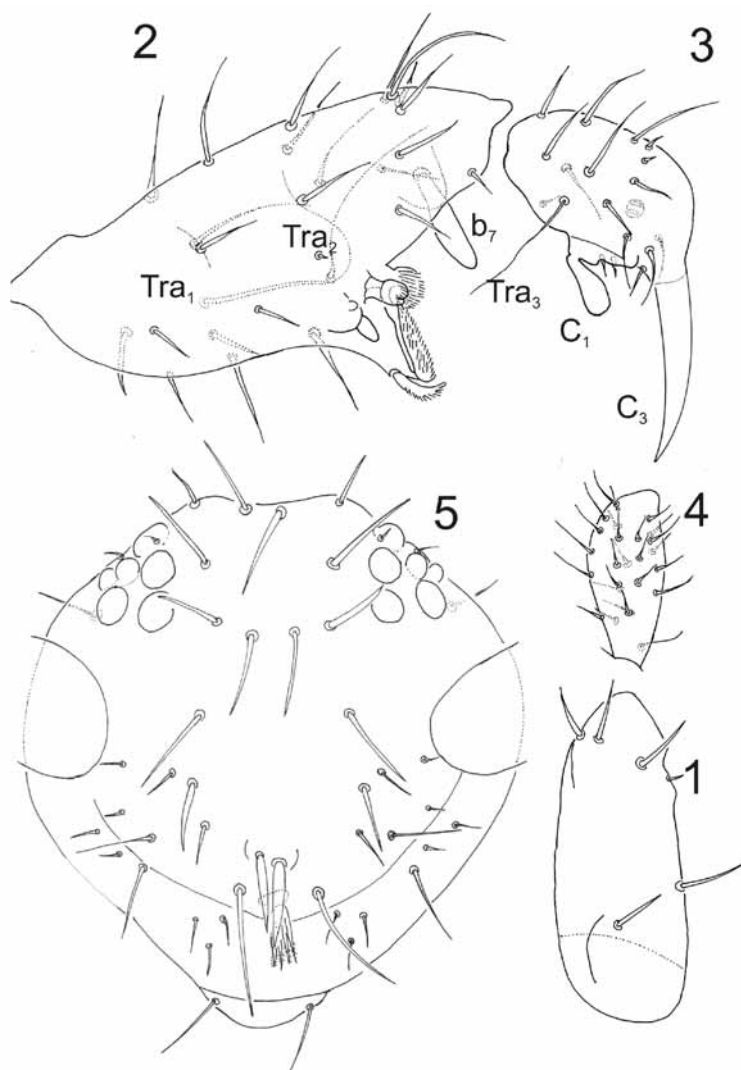
Type species: *Sminthurides seurati* Denis, 1925

Diagnosis (after Betsch 1980). Sminthurididae lacking tibiotarsal organ, the male antennae highly modified; trichobothrial elements in antenna are Tra1, Tra2 on Ant. II; Tra3 on Ant. III. Modified setae b1 to b6 on the same tubercle on Ant. II; b 7 on Ant. II, setae c1 and c3 (c3 is a strong spine) well developed on Ant. III; Ant. IV simple in both sexes. Spines with serrations on tibiotarsus II of males and females, and sometimes also on the anal segments of the female; coxa III with setae and one spine. Four organs in shape of bladders on the basis of tibiotarsus I on the male. Mucro with two lamellae, the inner can be serrate.

***Denisiella diomedesi* sp. nov.**

Figs 1–13

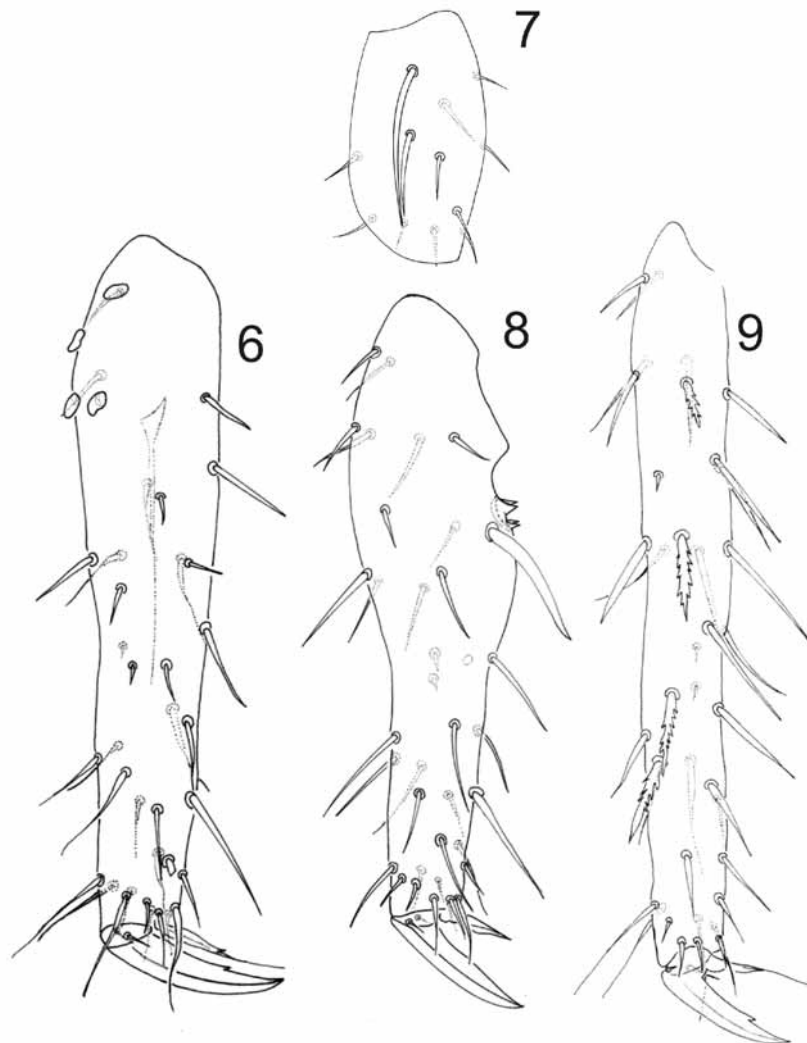
Description. Male. Length 650 μ m. Body and antennae purple. Legs and furcula almost transparent, with small purple pigment at their bases. 6 + 6 pigmented eyes.



FIGURES 1–5. *Denisiella diomedesi* sp. nov.: 1, right Ant. I, dorsal view; 2, left Ant. II, ventral view; 3, left Ant. III, dorsal view; 4, right Ant. IV, ventral view; 5, cephalic chaetotaxy.

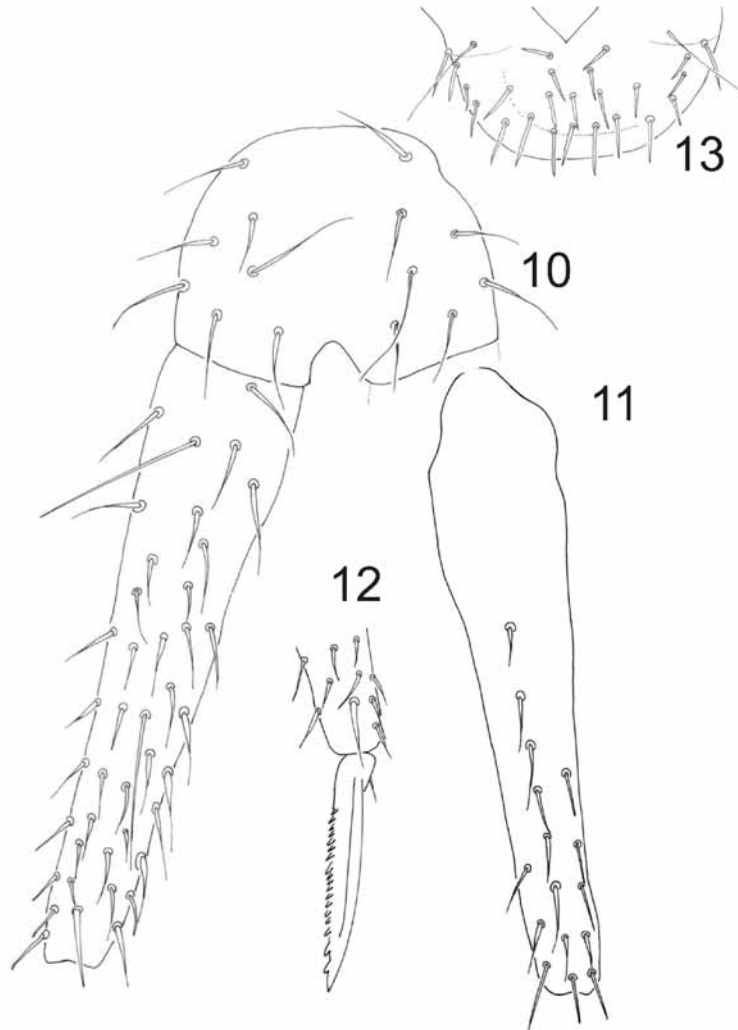
Antennae classically bent as in all Sminthurididae males, elbowed between Ant. II and III; ratio of antennal segments about 1: 0.9; 0.4; 0.5. Ant. I with 7 setae, two of them very small and thin (Fig. 1). Ant. II with 22 setae, two trichobothria (Tra1, Tra2) one microsensilla, and modified setae b1–6 on the same tubercle (Fig. 2). Ant. III with 10 setae, three setulae, one trichobothrium, one ventral microsensillum and the antennal organ with a pair of oval separate microsensilla (Fig. 3), seta c1 lamellate and c3 in the shape of a big spine. Ant. IV simple, elliptical with about 50 setae, only one olfactory setae difficult to distinguish (Fig. 4). The chaetotaxy of the head as in Fig. 5, on the anterior part of the middle line are two spine-like setae and below them a peculiar structure of one big alveolus with four strong setae with fine ciliations.

Leg I coxa with one seta, trochanter with three setae, femur with 11, tibiotarsus basally on the outer edge with four small organs, bladder-like, thick-walled, and highly elevated (Fig. 6), with about 30 setae, and two microsetae. Leg II coxa with one seta and one spine, trochanter with three setae, femur with 11 setae, two of them much longer (Fig. 7), tibiotarsus with 29 setae, two microsetae and one stout, thicker dorsal seta and one organ with four cone-like spines (Fig. 8). Leg III coxa with one seta, trochanter with three thin and small setae and one small spine, femur with 10 setae and one microseta, tibiotarsus with four stout and coarsely serrate spine-like setae, 26 setae and three microsetae, pretarsus with one setae on each side. Unguis without tunica and with one small inner tooth, unguiculus with long filament surpassing the unguis. Tibiotarsal organ absent (Fig. 9).



FIGURES 6–9. *Denisiella diomedesi* sp. nov.: 6, tibiotarsus I; 7 femur II; 8, tibiotarsus II; 9, tibiotarsus III.

Thoracic segmentation not evident. Dorsal chaetotaxy of small abdominal segment with thick setae (Fig. 13). Ventral tube with 1 + 1 seta. Corpus of tenaculum with two setae, basal appendix and three teeth. Genital and anal segments ankylosed into a single mass. Genital plate of the male with one pregenital seta and 4 + 4 eugenital setae. Manubrium with seven pairs of setae, one of them longer (Fig. 10). Dens with 42 posterior setae, two of them very long, internal ones thicker (Fig. 10), anterior surface with the setal formula 3, 3, 3, 2, 2, 1, 1, 1 (Fig. 11). Mucro with two lamellae, the inner serrate, with about 18 serrations, outer lamella smooth, one mucronal outer seta (Fig. 12). Length of manubrium 57 μm , dens 193 μm , and mucro 84 μm , ratio of manubrium, dens and mucro as 1: 3.3 : 1.5. Maximum length in μm of setae on head 40, body 37, dens 61, tibiotarsus 42.



FIGURES 10–13. *Denisiella diomedesi* sp. nov.: 10, chaetotaxy of manubrium and left dens, posterior side; 11, chaetotaxy of right dens anterior side; 12, apex of right dens and mucro, posterior side; 13, chaetotaxy of small abdomen.

Type locality. Panama: Panama Province, Chepo, Chichebere, in pitfall traps, rice paddyfield, B. Zachrisson coll., 15.viii.2002.

Type material. Holotype and two paratype males will be kept at Laboratorio de Ecología y Sistemática de Microartrópodos, Sciences Faculty, UNAM, México.

Etymology. This species is dedicated to Dr. Diomedes Quintero (Universidad de Panamá), for his help in the study of springtails from Panama.

Discussion. The sexual dimorphism of species in the genus *Denisiella* is very remarkable. Antennae of males are highly modified as a clasping organ and there are four organs on tibiotarsus I, apparently found in all the species of the genus. The modified setae on tibiotarsus II and the proximal cuticular conical spines are also present in *D. maesorum* but were not mentioned in the original description of the latter species.

The structures on Ant. II and III of *D. diomedesi* sp. nov. are similar to *D. maesorum*, except that Ant. II lacks the b6. The most diagnostic character of *D. diomedesi* sp. nov. and not found in other species the genus is the nasal organ on the head formed by a basal insertion and four ciliated setae in the same alveolus. The 4 bladder-like organs on tibiotarsus I of the new species are smaller than in other species.

New records

Denisiella sexpinnata (Denis, 1938)

New localities. Mexico: Nayarit: Punta Mita, ex small ponds, 10.ix.1981, J. Palacios-Vargas col. Nicaragua: Zelaya, el Recreo, ex soil, 1.x.1984, J.-M. Maes coll.

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References

- Bellinger, P.F., Christiansen, K.A. & Janssens, F. (1996-2007) *Checklist of the Collembola of the world*. Available from <http://www.collembola.org> (last accessed in Oct. 2007).
- Betsch, J.-M. (1980) Éléments pour une monographie des Collemboles Symphypléones (Hexapodes, Aptérygotes). *Mémoires du Muséum national d'Histoire naturelle, Nouvelle Série, Série A, Zoologie*, 116, 1–227.
- Börner, C. (1908) Collembolen aus Südafrika nebst einer Studie über die I. Maxille der Collembolen. In: L. Schultze, Forschungsreise im westlichen und zentralen Südafrika, *Denkschriften medicinisch-naturwissenschaftlichen Gesellschaft, Jena*, 13, 53–68.
- Castaño-Meneses, G., Palacios-Vargas, J.G., Basset, Y. & Winchester, N. 2006. Spatial variation in the structure community of canopy springtails (Hexapoda: Collembola) from San Lorenzo Tropical Forest, Panama. In: Abstracts of VIIth International Seminar on Apterygota, The Netherlands, 32.
- Denis, J.R. (1925) Sur les Collemboles du Muséum de Paris (2^{ème} partie). *Annales de la Société Entomologique de France*, 94, 261–290.
- Denis, J.R. (1931) Collemboles de Costa Rica avec une contribution au species de l'orde. Contributio alla conoscenza del "MICROGENTON" di Costa Rica, II. *Bollettino del Laboratorio de Zoologia in Portici*, 25, 69–170.
- Denis, J.R. (1938) Sur les Collemboles d'Afrique du Nord 4^{ème} Note. *Bulletin de la Société d'histoire naturelle de l'Afrique du nord, Algiers*, 28, 85–87.
- Folsom, J.W. (1932) Hawaiian Collembola. *Proceedings of the Hawaiian Entomological Society*, 8, 51–92.
- Folsom, J.W. & Mills, H.B. (1938) Contribution to the knowledge of the genus *Sminthurides* Börner. *Bulletin of the Museum of Comparative Zoology, Harvard*, 82, 231–274.
- Palacios-Vargas, J.G. (1995) A new species of *Denisiella* (Collembola: Sminthurididae) from Nicaragua. *Revista Nicaraguense de Entomologia*, 32, 25–33.
- Palacios-Vargas, J.G. (1992) Guide of Springtails of Panama and Costa Rica (Collembola). In: Quintero, D & Aiello, A. (Ed.), *Insects of Panama and Mesoamerica. Selected Studies*. Oxford University Press, Cambridge, 25–36.

- Palacios-Vargas, J.G. & Bernava, V. (1999) A new Mexican species of *Denisiella* (Collembola: Sminthuridae). *Journal of the Kansas Entomological Society*, 72, 447–450.
- Snider, R.J. (1988) *Denisiella lithophila*, a new species from a granite outcrop in Georgia (Collembola: Sminthurididae). *The Florida Entomologist*, 71, 124–129.