

On the genus *Americanura* Cassagnau, 1983 (Collembola: Neanuridae: Sensillanurini) with description of a new Mexican species and complement to the description of *A. mexicana* Cassagnau, 1983

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KEY WORDS
Antenno-frontal tubercle,
setae reduction,
México,
intraspecific variation,
new species.

ABSTRACT

A new diagnosis of *Americanura* Cassagnau, 1983 is done and a discussion on the genus' morphology is presented. A new species of the genus, from Chiapas State, Mexico, is described and illustrated; it is characterized by the fusion and reduction of the antenno-frontal tubercle and the highest reduction of its setae. A complement to the description of *A. mexicana* Cassagnau, 1983 is done including the morphological variation.

RÉSUMÉ

Le genre Americanura (Collembola: Neanuridae: Sensillanurini), avec la description d'une nouvelle espèce mexicaine et un complément de description pour A. mexicana Cassagnau, 1983.

MOTS CLÉS
Tubercle antennofrontal,
setal réduction,
Mexique,
variation intraespécifique,
espèce nouvelle.

Une nouvelle diagnose d'*Americanura* Cassagnau, 1983 est proposée et une discussion sur la morphologie du genre est présentée. Une nouvelle espèce de ce genre, originaire de l'État des Chiapas, Mexique, est décrite et illustrée : elle est caractérisée par la fusion et la réduction du tubercule antenno-frontal et la plus forte réduction de ses soies. Un complément à la description de *A. mexicana* Cassagnau, 1983 est donné, y compris la variation morphologique.

INTRODUCTION

The genus *Americanura* Cassagnau, 1983 has a wide distribution in North America, México, Central America and the Northern part of South America, with 21 species known in the region (Bellinger *et al.* 2016). The setal morphology among the family tribe Sensillanurini Cassagnau, 1983 (Neanuridae Boerner, 1901), is very interesting because they have setae of different size and shape, from smooth, with few ciliations, to many barbulations, to palmate with many ornamentations. This tribe is also characterized by hypertrophy of the sensillum S7 on Ant. IV (Deharveng 1981; Palacios-Vargas *et al.* 2009)

Members of this genus prefer to live under the bark of trees or in rotting trunks, that is why few specimens are obtained from litter and soil samples processed by Berlese-Tullgren funnels. Many species from Central America are waiting for description, but the number of specimens is often not enough to make good descriptions (Vázquez pers. comm.).

Species in this tribe show some intraspecific morphological variation as pointed out by Paniagua Nucamendi (2014). So we provide here the variation found in the type species *A. mexicana* Cassagnau, 1983 as well as in the new species described here.

This contribution is part of the Ph. degree research of the senior author on the “Systematic of the Sensillanuri (Collembola: Neanuridae)” using morphological and molecular data. The molecular results are under preparation and will be part of another contribution.

MATERIAL AND METHODS

The specimens for the descriptions were extracted by Berlese funnels from leaf litter and preserved in 96% ethanol. Afterwards, they were mounted on semi-permanent slides in Hoyer's solution. Drawings and measurements were done via a phase contrast microscope with drawing tube. One paratype will be deposited at the Muséum national d'Histoire naturelle of Paris (MNHN), the holotype and other paratypes will be deposit at the collection of Microarthropods of Faculty of Sciences (UNAM).

The chaetotaxy designation follows mainly Palacios-Vargas & Simón Benito (2007).

ABBREVIATIONS

Abd.	abdominal segment;
Af	cephalic antenno-frontal tubercle;
Ant.	antennal segment;
BM	barbulate macrosetae;
bm	barbulate microsetae;
Bme	barbulate mesosetae;
Cl	clypeal tubercle;
De	dorso external tubercle;
Di	dorso internal tubercle;
DL	dorso lateral tubercle;
L	lateral tubercle;
M	macrosetae with few barbulations;
m	microsetae with few barbulations;
Oc	ocular tubercle;
Oca	ocular anterior seta;

Ocm	ocular median seta;
Ocp	ocular posterior seta;
S	cylindrical sensilla on Ant. IV;
S.g.d.	dorsal guard sensillum;
S.g.v.	ventral guard sensillum;
So	sub-ocular tubercle;
ss	sensorial setae;
Th.	thoracic segment.

Institutions

MNHN	Muséum national d'Histoire naturelle, Paris;
UNAM	Faculty of Sciences, Universidad Nacional Autónoma de México.

SYSTEMATICS

Family NEANURIDAE Boerner, 1901
 Subfamily NEANURINAE Boerner, 1901
 Tribe Sensillanurini Cassagnau, 1983

Genus *Americanura* Cassagnau, 1983

TYPE SPECIES. — *Americanura mexicana* Cassagnau, 1983.

DIAGNOSIS. — 2 + 2 dark pigmented eyes. Lack of any hypodermic body pigment. Reduced mouthparts, maxillae styliform. Antennal sensillum S7 on Ant. IV hypertrophied, at least twice the thickness of all the other S sensilla. Posterior cephalic setae in two groups, one dorsointernal (Di1) isolated from one to three other (Di2 plus De1 and De2). Seta De2 located behind Di2. Dorsolateral (DL) tubercle usually separately and with two setae. Lateral and subocular cephalic tubercles (L + So) difficult to distinguish. Dorsointernal tubercle (Di) and Di setae of prothorax (Th. I) always absent; tubercle De of Th. I with one or two setae and always one seta on tubercle DL. Tubercle Di of Abd. IV and V with one or two setae. Tubercle DE, DL and L of Abd. V often fused with reduced chaetotaxy. Six or eight crenulated setae between sensory setae on Abd. IV, and four or two setae between sensory Abd. V. Dorsal setae crenulated or barbulated, rarely palmate.

REMARKS

The sensorial setae of the body are very stable in all the members of the tribe, *Americanura* and the related genera *Palmanura* Cassagnau, 1983; *Sensillanura* Deharveng, 1981 and *Tabasconura* Palacios-Vargas & Catalán, 2015. For the characterization of the members of these taxa it has been used mainly the dorsal chaetotaxy and sometimes the fusion of the cuticular tubercles, which sometimes is difficult to do because the low development they can have.

Some chaetotaxy characters in *Americanura* are very stable when the presence vs absence is taken into account, as we have realized after a comparison of 21 named valid species plus the new one described here and two further under preparation (Vázquez pers. comm.). Besides the tribe diagnostic morphology, the genus has always the cephalic setae F, G, B, Ocm, and Di1. Nevertheless, the seta G very rarely can lack but can be overlooked because it is always a tiny seta. The seta A, is found only in half of the species, Oca is present only in 25% of the cases and Ocp is lacking in 20%. The De tubercle has one seta (14 cases), two setae (three cases) or three setae (seven cases). Sometimes the microsetae (Di2 and De2) can be asymmetrically present. The combination of cephalic setae can be diagnostic for

most species. In the dorso-external tubercle on Th. I, there is one seta (nine cases) or two setae (15 cases). On dorso-internal tubercle of Th. II, nine species had one seta, 13 had three setae and only two presented two setae. The dorso-external tubercle of Th. II has two setae in most of the taxa (15) and one in nine species, and the DL tubercle of the same thoracic segment has one seta (three cases), two setae (seven) or three setae (14). A similar condition happens on Th. III. The abdominal segments I to III have always the same chaetotaxy, Di and De tubercles have one seta (nine cases) or two (15 cases) and DL has one (seven cases) or two setae (17 cases). The dorso-internal tubercle of the abdominal segments IV and V had in 50% of the species one seta and two in the other 50%.

Americanura mexicana Cassagnau, 1983
(Table 1)

Americanura mexicana Cassagnau, 1983: 15.

NEW RECORDS. — Estación científica La Malinche, Tlaxcala, México. 19°14'36.94"N, 98°0'10.95"W; 3289 m altitude. *Ex.* Pine litter. 10.VII.2015, F. Villagomez, A. Ruiz y A. Román Cols.

EMENDED DESCRIPTION

The detailed description of *A. mexicana* was based on four specimens from Derrame del Chichinautzin, Morelos state at 2400 m a.s.l. and one additional specimen from Tlamacas, Popocatepetl volcano in Mexico State at 3800 m a.s.l. (Cassagnau & Palacios-Vargas 1983). Recent material collected at Tlaxcala State has shown an important variation in the dorsal chaetotaxy which has been studied in five specimens for the complement to the description.

Body

Length (n = 5) 1.42 mm (2 mm in the original description). Color white. Granulations strong, about the size of one eye. Tubercles well developed. Body setae differentiated as barbulate macrosetae, barbulate microsetae, microsetae and macrosetae with few barbulations, besides the sensorial setae.

Antenna

Ant. I with seven setae, three dorsal are BM, Ant. II with 11 setae, 2 or 3 BM.

Head

Eyes 2 + 2 with black pigment. Mandibles with three teeth, maxillae styliform. Head with ocular tubercle isolate, Di, De and (DL + L + So) tubercles well developed.

Thorax

Tibiotarsi I, II and III without tenent hairs, with 18, 18, and 17 setae respectively. Thoracic and abdominal chaetotaxy is shown in Table 1.

Abdomen

Ventral tube with 4 + 4 setae, one distal pair of setae much longer than anterior pairs. Furcal vestige, with five setae.

TABLE 1. — Total chaetotaxy of *Americanura mexicana* Cassagnau, 1983 on head and by demi-tergite on thorax and abdomen. Letters in bold means variations on the specimens

Head setae group	Tubercles	Number of setae	Kind of setae	Setae
Cl	1	4	BM, m	FG
Af	2	4	2 BM, m	ABD
Oc	2	6	2 BM, m	Oca , Ocm, Ocp
Di	2	2	1 BM	Di1
De	2	6	1 BM, 2m or bm	Di2 De1 De2
DL+L+So	2	16-18	6-8 BM, 2-4 M, bm or m	No homologies done
Total amount		7	37	

Thorax	Di	De	DL	L
I	–	–	BM	–
II	BM, 2 bm, m	BM, bm	BM, 2me+s+ms	2 BM, bm
III	BM, 2 bm, m	BM, bm+s	BM, 2me+s	BM, bm, m

Abdomen				
I	BM, bm	BM, bm+s	BM, bm	BM, bm, m
II	BM, bm	BM, bm+s	BM, bm	BM, bm, m
III	BM, bm	BM, bm+s	BM, bm	BM, bm, m
IV	BM, bm or m	BM, bm+s	2 BM or 1MB / 3-4 bm	
V	BM, bm or only BM	2 BM+m		
VI		2 BM, 2 or 3 M, 2 or 3m (7)		

Genital plate of female with three pairs of pregenital setae, 12 circumgenital setae and two eugenital setae. Each lateral anal valve with 11 setae and two microsetae. Posterior anal valve with three microsetae.

REMARKS

After the original description, in the clypeal tubercle there are always two pairs of setae, F and G; nevertheless, the setae G are microsetae, so very often difficult to observe. The antennofrontal tubercle has always the setae A and B, and sometimes the setae D, which are very small and unstable, they were observed only in one specimen from the five studied. The ocular setae Ocm and Ocp are well developed as barbulate macrosetae, but one specimen had the Oca as microsetae. The cephalic seta Di1 is very stable, always as barbulate macroseta, but in the De tubercle there is one barbulate macroseta and two microsetae, last two can be smooth or barbulate, sometimes one of them can be asymmetrically lacking. The chaetotaxy of the tubercles DL, L and Sc can show a big variation in the shape of the setae (macrosetae and microsetae barbulate or smooth), and the amount is 16 or 18 per side. DL tubercle of Th. II of one specimen had four setae (2 BM and 2 bm) instead of three setae (2 BM and m), another specimen had only one barbulate macroseta on one side and two on the other side, a common case of setal asymmetry as cited by Najt & Massoud (1976). Di tubercle on Th. II and III usually has one BM and 2 bm, but two specimens had two additional microsetae. In one specimen, the lateral tubercle of Th. II and III had two setae instead of three and one had one additional microseta. Abd. I-III are very stable in their chaetotaxy and show no variation, but on Abd. IV microsetae of Di tubercle can be smooth or barbulate and tubercles DL and L can be fused or not (each

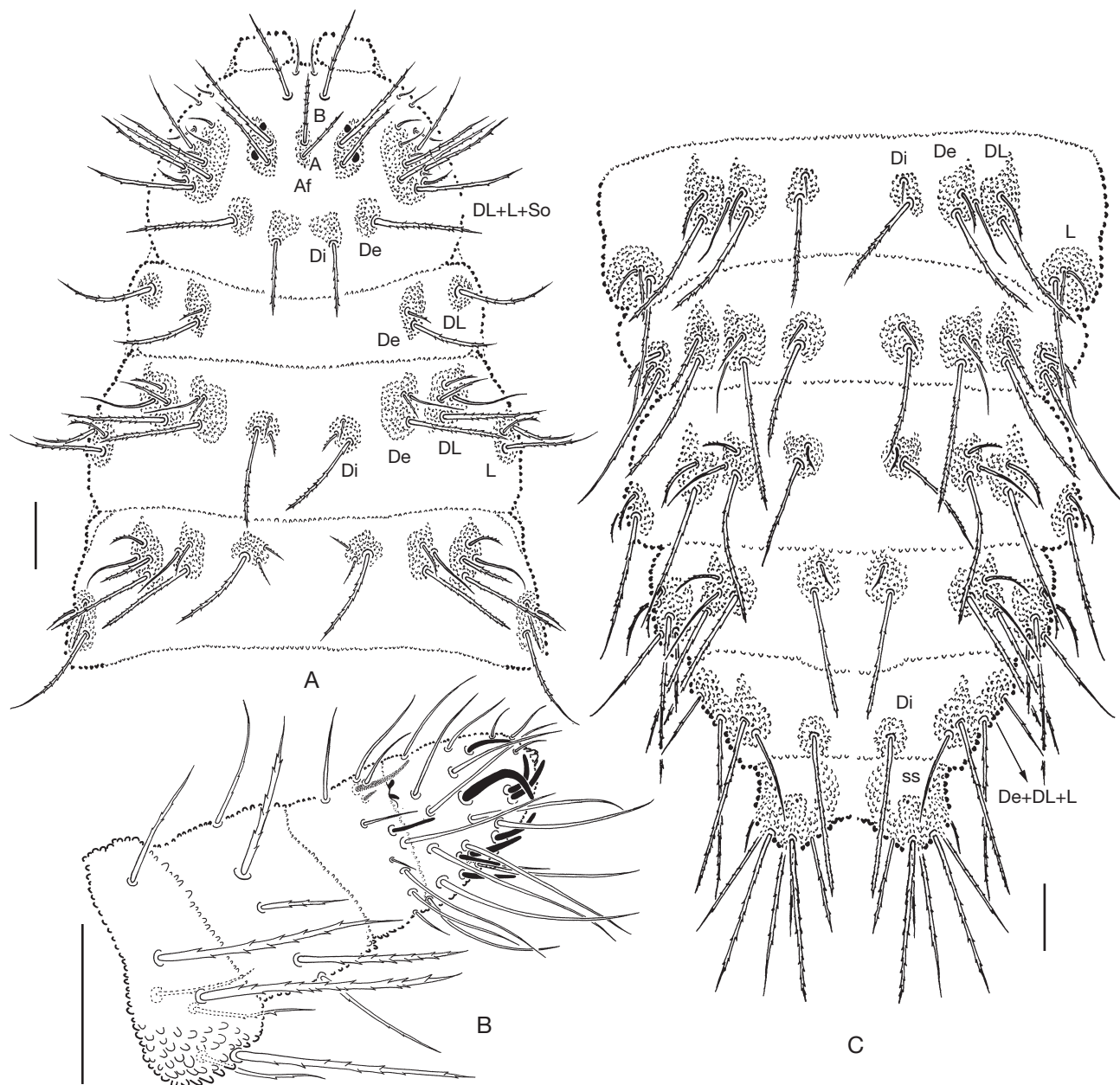


FIG. 1. — *Americanura najtae* n. sp.: **A**, dorsal chaetotaxy of head and Th. I-III; **B**, dorso-lateral chaetotaxy Ant. I-IV; **C**, Abd. I-VI, dorsal chaetotaxy. Abbreviations: see Material and methods. Scale bars: A, C, 150 μ m; B, 50 μ m.

with two setae, or DL with 1 and L with 3-4 setae). Di tubercle of Abd. V has two BM, but two specimens from Tlaxcala had only one seta and De tubercle had three setae instead of two.

Americanura najtae n. sp.
(Figs 1, 2; Table 2)

TYPE MATERIAL. — Holotype adult ♀ (catalog number 22298) and five paratypes on slides; one skin from adult male prepared on slides after barcode extraction (voucher catalog number 22303), two ♂ preadults (catalog numbers 22301, 22302) and two juveniles (catalog numbers 22299, 22300) all with the same collecting data as the holotype, all of them deposited in the Colección de Collembola de México, belong-

ing to the laboratory of Ecology and Systematics of Microarthropods (LESM); UNAM. One paratype preadult ♂ (catalog number 22301) will be deposited at the Laboratory of Entomology of the MNHN.

TYPE LOCALITY. — México, Chiapas: Finca Santa Fe (La Esperanza) 15°18'33.21"N, 92°26'7.93"O, 843 m altitude. Former vegetation of this Chiapas mountains was oak forest, now there are coffee plantations. *Ex* leaf litter, 14.III.2004, J. G. Palacios-Vargas coll.

DIAGNOSIS. — *Americanura najtae* n. sp. is characterized by the total fusion of the tubercle antennofrontal and the highest setal reduction in such tubercle in the genus. This new species is similar to *A. castillorum* Palacios-Vargas & Najt, 1986 in having two setae in the dorsoexternal tubercle of Th. I, but differs by having only one seta in the cephalic dorsoexternal tubercle (two in *A. castillorum*); and two ocular setae (three in *A. castillorum*) and lacking any tooth

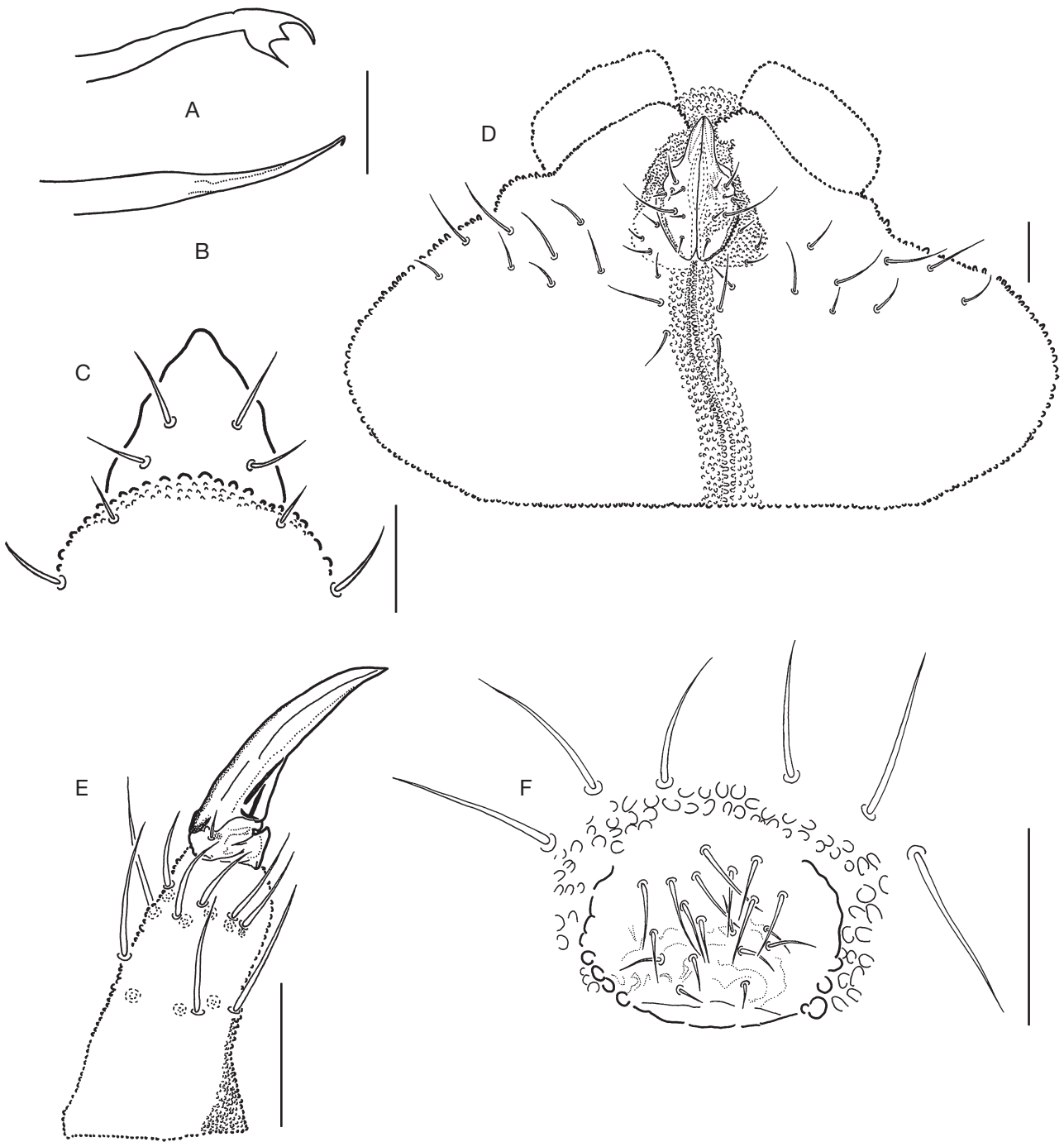


FIG. 2. — *Americanura najtae* n. sp.: **A**, mandible; **B**, maxilla; **C**, labrum; **D**, ventral view of the head and labium; **E**, tibiotarsus III; **F**, female genital plate. Abbreviations: see Material and methods. Scale bars: A-C, 20 μ m; D-F, 50 μ m.

on ungues; it has only one seta on the dorsointernal tubercle of abdominal segment V. *A. najtae* n. sp. is easily distinguished from all the species in the genus because it has only one setae A and one seta B in the middle of antennofrontal tubercle which is very reduced.

VARIATION. — Few variations were found in the chaetotaxy of this species. The cephalic De tubercle can have one additional microseta.

The cephalic DL + L + Sc of one specimen has nine setae instead of 10 and the most frequent variation found was the shape of the setae. On Abd. IV there was observed a variation of the shape of the setae on the tubercle DI + L.

ETYMOLOGY. — The new species is named after Dr Judith Najt for her contributions to the Neotropical Collembola.

TABLE 2. — Total chaetotaxy of *Americanura najtae* n. sp. on head and by demitergite on thorax and abdomen.

Head setae group	Tubercles	Number of setae	Kind of setae	Setae
Cl	1	4	BM, m	FG
Af	–	2	Meb	AB
Oc	2	4	BM	Ocm, Ocp
Di	2	2	BM	Di1
De	2	2	BM	De1
DL+L+So	2	26	5 BM, bm, 7m	No homologies done
Total amount	7	40		

Thorax	Di	De	DL	L
I	–	BM, bm	BM	–
II	BM, 2 bm	BM, bm+s	BM, 2me+s+ms	2 BM, bm
III	BM, 2 bm	BM, bm+s	BM, 2me+s	BM, 2 bm

Abdomen

I	BM, bm	BM, bm+s	BM, bm	BM, 2 m
II	BM, bm	BM, bm+s	BM, bm	BM, 2 m
III	BM, bm	BM, bm+s	BM, bm	Bm, 2 m
IV	BM, bm	(2 BM, bm+s)	(3 BM, 2 bm)	
V	BM		2 BM+s	
VI			4 BM, 3m (7)	

DESCRIPTION

Body

Length (n = 4) 1.8 mm. Color white. Granulations strong, about the size of one eye. Tubercles well developed except antenno-frontal and cephalic dorsointernal, which are very slightly defined. Five kinds of body setae, barbulate macrosetae, barbulate microsetae, barbulate mesosetae, microsetae and macrosetae with few barbulations, besides the sensorial setae (Fig. 1A, C).

Antenna

Ant. I with seven setae, three dorsal barbulate macrosetae, Ant. II with 11 setae, 3-4 dorsal BM Ant. III sensorial organ with two rod-shaped sensilla separated in the lateral apical part of Ant. III by a small cuticular fold, and with two guard sensilla. S.g.v. almost straight, one microsensillum ventro-external relatively long. Ventral chaetotaxy of Ant. III similar to that described for *Endonora* by Smolis (2008) except that basal setae of Vc group which are ¾ the length of those of distal part. Ant. IV as typical for the genus (Fig. 1B) with sensilla S7 hypertrofied, 12 setae, subapical organ and ordinary setae “I”; ventrally as that described by Smolis (2008), with three “file” setae at the “ca” group instead of two.

Head

Eyes 2 + 2 with dark pigment. Mandibles with three teeth (Fig. 1A), maxillae styliform (Fig. 2B) with apex hooked. Head with ocular tubercle isolate, Di, De and DL + L + So tubercles well developed. Head chaetotaxy as in Fig. 1A. Labrum with four prelabral setae and two pairs of setae (Fig. 2C). Labium with the normal setae for the tribe and three pairs of postlabial setae (Fig. 2D). Tibiotarsi I, II and III without tenent hairs, with 18, 18, and 17 setae respectively (Fig. 2E).

Thoracic and abdominal chaetotaxy in Figure 1A and C. Total chaetotaxy as in Table 2.

Abdomen

Ventral tube with 4 + 4 setae, the two distal pairs of setae slightly longer than anterior pairs. Furcal vestige, with four setae, and group Ve with only four setae. Ventrally on Abd. V, Vei and Vec identical to *Endonura*, and Vel and VI similar but with one very long setae, about three times the length of other setae of the group. Genital plate of female with three pairs of pregenital setae, 17 circumgenital setae and two eugenital setae (Fig. 2F). Each lateral anal valve with 11 setae and two microsetae. Posterior anal valve with three microsetae.

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