

REMARKS ON *STACHORUTES* (COLLEMBOLA: PSEUDACHORUTIDAE) WITH A NEW MEXICAN SPECIES

JEAN-MARC THIBAUD* AND JOSÉ G. PALACIOS VARGAS**

* Laboratoire d'Entomologie, Museum National d'Histoire Naturelle, UPRES A 8043 ; 45, rue Buffon, 75005 Paris, FRANCE.

** Laboratorio de Ecología y Sistemática de Microartrópodos, Depto. Biología, Facultad de Ciencias, UNAM. 04510 México, D.F., MEXICO.

ABSTRACT. We redefine the genus *Stachorutes*. A new Mexican species from littoral sand is described and keys for the species of this genus, and those of *Furculanurida*, are included.

KEY WORDS: *Stachorutes*, *Furculanurida*, taxonomy, keys.

RESUMEN. Se redefine el género *Stachorutes*; se proporciona la descripción e ilustraciones de una nueva especie mexicana de arena litoral y se incluyen claves para la identificación de las especies de este género y de *Furculanurida*.

PALABRAS CLAVE: *Stachorutes*, *Furculanurida*, taxonomía, claves.

Stachorutes was originally described by Dallai (1973) to include one Italian species close to *Pseudachorutes*, but without a mucro and reduced number of eyes. Deharveng (1982) cited the presence of one species from France (Corse), but never named it. Since 1983 seven species have been described from different places.

We place in synonymy *Chihuahuaachorutes* with *Stachorutes*: *Chihuahuaachorutes escobarae* Palacios-Vargas, 1990 = *Stachorutes escobarae* (Palacios-Vargas, 1990) nov. comb.; this species has no eyes and a reduced furcula, so it fits in the redefinition of the genus we made.

Barra (1994) described *Stachorutes riebi* from littoral dunes of Natal (South Africa), but is not a real *Stachorutes* because the postantennal organ is moruliform (17-18 vesicles) and has a different sensorial organ on Ant. III.

In this paper we redefine *Stachorutes*, describe a new species, and give a key to all the species presently considered in it.

This is the second record of the *Stachorutes* for Mexico and the entire Neotropical Region, and it represents the first littoral species known in this genus.

We discuss the morphology of this genus and also that of *Furculanurida*, giving a key for its species and reconsidering the position of *F. arlei*.

MATERIAL AND METHODS

The specimens were collected by the authors at a beach from the State of Quintana Roo and extracted by sand washing. The specimens were preserved in alcohol and mounted in Marc André solution. Drawings were done with the aid of a drawing tube in a phase contrast microscope.

Stachorutes Dallai, 1973

REDEFINITION: Small species with the appearance of *Pseudachorutes*. Strong to moderate cuticular granulation. Ant. IV with simple apical vesicle (rarely with a slight tendency to be trilobed), 5 or 6 thick cylindrical sensilla and one microsensillum. Mandible with 2-3 large teeth; maxilla simple, styletiform. Number of eyes reduced (0, 1, 2 or 5). Postantennal organ rounded or elliptical with 4 to 11 vesicles, never moruliform. Mesothorax with microsensillum (ms). Tibiotarsi without clear clavate tenent hairs. Unguis without teeth and empodium. Ventral tube with 4 + 4 setae. Sensory setae on the body short (much shorter than the length of the segment) in position of p3 and m7 on the thoracic segments, and p4 from Abd. I to IV and p2 on Abd. V. Sensorial formula of the body is 022/11111. Tenaculum with 2 or 3 teeth. Furcula reduced; dens with 3 to 6 setae; mucro absent or very small fused to dens (mucrodens). Anal spines absent.

Type species: *Stachorutes dematteisae* Dallai, 1973.

Stachorutes maya sp. nov.

(Figs. 1-11)

DESCRIPTION: Length 0.4 mm. Colour in alcohol gray-white, eyes darker. Tegumentary granulation fine. Ant. I with 7 setae. Ant. II with 11 setae. Ant. III and IV fused dorsally, ventral clearly separate. Sensory organ of Ant. III with two microsensilla and two cylindrical guard sensilla, the ventral straight and longer than the dorsal one, one ventral microsensillum is also present. Ant. IV with a large simple apical vesicle, 6 thick (5 are cylindrical and one longer lanceolate) setae, one subapical microsensillum and one subapical organ; three ventral lanceolate and long setae (Fig. 1).

Postantennal organ elliptical, with 8-11 vesicles. Two very small eyes on each side of the head, on separate dark patches (Fig. 2).

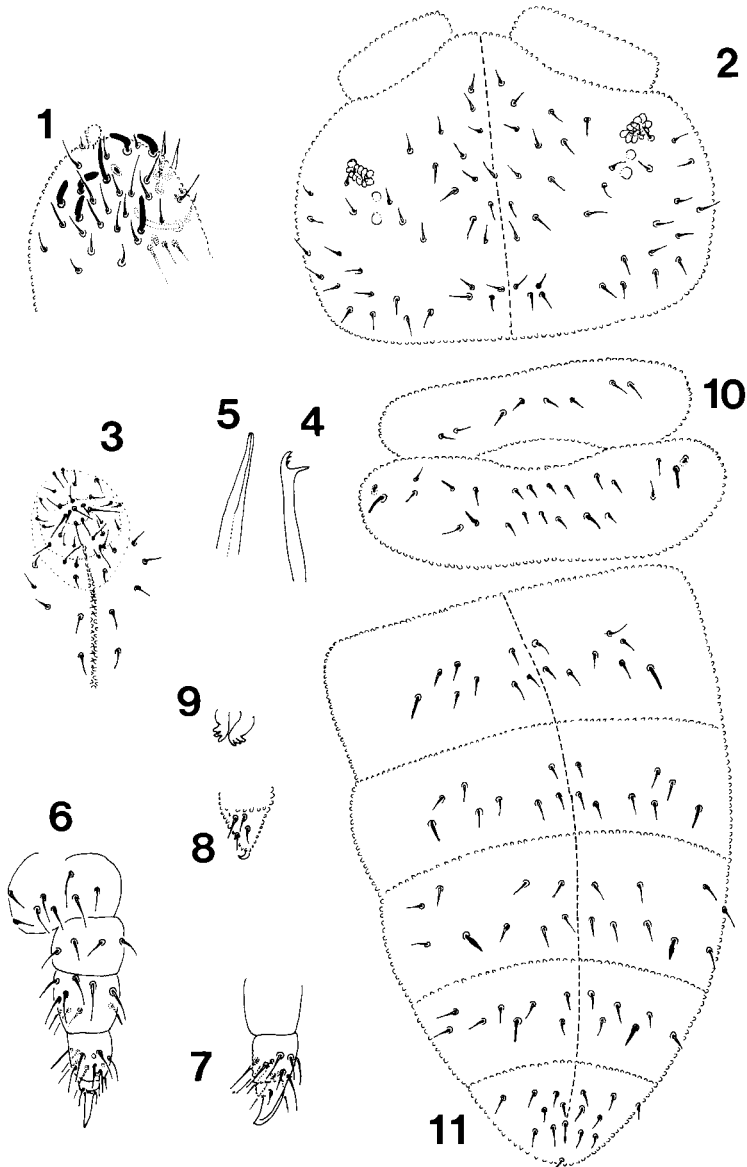
Buccal cone typical of the genus (Fig. 3). Labral setae formula is : 2/4352. Two pairs of postlabial setae. Mandible with two big teeth and two smaller and difficult to see (Fig. 4). Maxilla styletiform (Fig. 5).

Leg chaetotaxy from I to III as follows: tibiotarsi (15, 15, 13) (Figs. 6 and 7); femora (13, 11, 10); trochanters (5, 5, 5). Two pretarsal setae. Unguis without teeth; empodial appendage absent (Fig. 7).

Furcula reduced. Mucrodens with four setae, mucro fused to dens, small, and falcate (Fig. 8). Ratio mucro: dens; unguis = 1: 3.0; 3.8. Tenaculum with 3 + 3 teeth (Fig. 9).

Dorsal chaetotaxy of head and body as in figures 2, 10 and 11, with ordinary setae short; sensory setae formula is: 022/11111; sensory setae are short and thick, particularly developed on abdominal segment IV. Thoracic sternum without setae. Ventral tube with 4 + 4 setae.

Type locality : Mexico: Quintana Roo, Cancun, sand beach of Delfines, 30-III-1999. J. Palacios and J.-M. Thibaud colls.



Figs. 1 - 11. *Stachorutes maya* sp. nov. 1, antennal segments III and IV; 2, head chaetotaxy, postantennal organs and eyes; 3, buccal cone, labral and labial chaetotaxy; 4, mandible; 5, maxilla; 6, chaetotaxy of leg I, ventral view; 7, chaetotaxy of tibiotarsus III, lateral view; 8, mucrodens; 9, tenaculum; 10, dorsal chaetotaxy of prothorax and mesothorax; 11, dorsal chaetotaxy of abdomen II to VI.

Thibaud y Palacios-Vargas: New species of Stachorutes

Type material: Holotype preadult male, one paratype preadult male and one paratype juvenile. Holotype deposited in UNAM and paratypes in MNHN.

Etymology: Species is named after the Mayan culture, that was developed in the region.

Discussion: *Stachorutes maya* sp. nov. is near to *S. dallai* Weiner and Najt, 1998 from Tanzania and *S. dematteisae* Dallai, 1973 from Italy, in having only two eyes on each side of the head, and a well developed mucrodens.

S. maya differs clearly from *S. dallai* in having 3 + 3 tenacular teeth (vs. 2 + 2) and the presence of 5 thick blunt sensilla (the sixth is lanceolate), three ventral lanceolate setae (only one in *S. dallai*), a reduction in tibiotarsi chaetotaxy (15, 15, 13 vs 19, 19, 18), but they have the same number of vesicles (8-10) in the postantennal organ, although different in shape. Dorsal chaetotaxy is identical in both species, except that the sensory setae are shorter and thicker and candle-shape in the last abdominal segments in *S. maya*. *S. dematteisae* differs from both species in having a small number of vesicles in the postantennal organ (4-7).

Remarks on the variation of the morphology in *Stachorutes*. Species in this genus are very small; the biggest is *S. novajellus*, which measures from 0.8 to 1.2 mm, the smallest are *S. maya* and *S. escobarae* which are about 0.4 mm. The colour is white, gray or gray-blue. The eyes can be absent or 1, 2 or 5 per side. The species have 5 or 6 thick antennal sensilla and one apical bulb; only two species, *S. longirostris* and *S. novajellus*, have the bulb slightly trilobed. Postantennal organ can be circular or elliptical and the number of vesicles varies from 4 to 11. Mandibles with 2 or 3 large teeth, sometimes plus small teeth. Setation of tibiotarsi is reduced only in *S. maya* (15, 15, 13) and *S. escobarae* (12,11,11). Furcula always with manubrium and mucrodens, or without mucro. Dens (or mucrodens) bears from 3 to 6 setae. Dental setae are subequal; only in two cases, *S. sphagnophilus* and *S. jizuensis*, there is 1 long seta and 4 short setae. Three species *S. dematteisae*, *S. sphagnophilus* and *S. jizuensis* lack mucro. One species is known from the United States of America, two from México, five from Europe, one from Africa and one from China.

Key to the species of *Stachorutes*

- 1. Without eyes; Ant. IV with 6 cylindrical sensilla, postantennal organ with 9 vesicles, dens with 3 setae, very little mucro *S. escobarae* (Palacios-Vargas, 1990)
- 1' With eyes 2
- 2. One eye on each side of the head; Ant. IV with 5 flame-shaped sensilla, postantennal organ with 8 vesicles, dens with 5 setae, no mucro *S. jizuensis* Tamura, 1997
- 2' Two or five eyes on each side of the head 3
- 3. Two eyes on each side of the head 4
- 3' Five eyes on each side of the head 7

- 4. Furcula without trace of mucro 6
- 4' Furcula with a small mucro fused to dens (mucrodens) 5
- 5. Tenaculum with 2+2 teeth, dens with 5 setae, mandible with two teeth
 *S. dallai* Weiner & Najt, 1998
- 5' Tenaculum with 3+3 teeth, dens with 4 setae, mandible with two large teeth and
 two small teeth *S. maya* sp. nov.
- 6. Tenaculum with 2+2 teeth, dens with 4 setae of the same length
 *S. dematteisae* Dallai, 1973
- 6' Tenaculum with 3+3 teeth, dens with 5 setae, one longer than other
 *S. sphagnophilus* Slawska, 1996
- 7. Dens with 6 setae 8
- 7' Dens with 5 setae *S. valdeaubarensis* Arbea & Jordana, 1991
- 8. Colour white, tenaculum with 2+2 teeth *S. navajellus* Fjellberg, 1994
- 8' Colour blue-gray, tenaculum with 3+3 teeth 9
- 9. Bucal cone elongated, apical lobe of Ant. IV with small tendency to divide
 *S. longirostris* Deharveng & Lienhard, 1983
- 9' Bucal cone stout, apical lobe of Ant. IV simple
 *S. scherae* Deharveng & Lienhard, 1983

Comparison between *Stachorutes* and *Furculanurida* genus

After revision and comparison of the members of *Stachorutes* and *Furculanurida* we have arrived to the conclusion that the species *F. arlei* Thibaud & Massoud, 1980, that was recently put into the *Stachorutes* by Weiner and Najt (1998) should be kept in *Furculanurida*, as this species has 8 thick sensilla on antennal segment IV as do all the members of that genus, long sensorial setae on the body and a small tooth in the unguis. Since this genus is very similar to *Stachorutes*, except for the better developed furcula and the mandible with more teeth in *Furculanurida*, we have given a new key for these species. The most recent key for the species in this genus was given by Thibaud & Massoud (1980), when there were seven species. We leave out *S. perplexa* (Salmon, 1956), as it seems to belong to another genus and have included four more species.

Key to the species of *Furculanurida*

- 1. Without eyes *F. africana* (Massoud, 1963)
- 1' With eyes 2
- 2. With two eyes per side *F. furculata* (Salmon, 1956)
- 2' With more than two eyes per side 3
- 3. With seven eyes per side *F. goeldiana* Arlé & Rufino, 1976
- 3' With six, five or four eyes per side 4
- 4. With four eyes per side *F. arawakensis* Thibaud & Massoud, 1983
- 4' With five or six eyes per side 5
- 5. With five eyes per side 6

Thibaud y Palacios-Vargas: New species of *Stachorutes*

- 5' With six eyes per side 8
6. Mandible with two teeth *F. arlei* Thibaud & Massoud, 1980
6' Mandible with four to six teeth 7
7. Body deep blue, postantennal organ circular *F. belemensis* Arlé & Rufino, 1976
7' Body gray or gray-blue, except for part of head and thorax which are white,
postantennal organ elliptical *F. grandcolasorum* Weiner & Najt, 1998
8. Mandible with four teeth 9
8' Mandible with ten teeth *F. longisensillata* Najt, Thibaud & Weiner, 1990
9. Tenaculum with 2+2 teeth *F. duodecimoculata* Thibaud & Massoud, 1980
9' Tenaculum with 3+3 teeth *F. ashrafi* Yosii, 1966

ACKNOWLEDGMENTS

Daniel Estrada helped in field work, and Blanca Mejia made the slides for this project. Dr. Kenneth A. Christiansen (Grinnell College, Iowa, USA) and Dr. Bellinger (Northridge University, USA), kindly reviewed the manuscript and suggested some changes. This contribution was done thanks to the collaboration of UNAM and National Museum of Natural History of Paris, and the support of Dirección General de Relaciones Internacionales of the UNAM.

LITERATURE CITED

- BARRA, J.-A. 1994. Nouveaux Collemboles Poduromorphes de la Province du Natal (Rep. Sud Africaine) (Insecta: Collembola). *Journal of African Zoology*, 108: 181-189.
DALLAI, R. 1973. Ricerchi sui Collemboli. XVI. *Stachorutes dematteisi* n. gen., n. sp., *Micranurida intermedia* n. sp. e consideratzionesul genere *Micranurida*. *Redia*, 54: 23-31.
DEHARVENG, L. 1982. Contribution à la connaissance taxonomique et phylogénétique des Neanuridae 1. Le genre *Rusekella* n. g. et ses implications phylogénétiques. *Bulletin de la Société d'Histoire Naturelle*, Toulouse, 118: 235-251.
PALACIOS-VARGAS, J.G. 1990. Nuevos Collembola del Estado de Chihuahua, Mexico. *Folia Entomologica Mexicana*, 79: 5-32.
THIBAUD, J.-M. & Z. MASSOUD, 1980. Etude des Collemboles de certains milieux du Maroc et considérations biogéographiques sur la faune du Maghreb. *Revue suisse de Zoologie*, 87: 513-548.
WEINER, W. M. & J. NAJT, 1998. Collembola (Entognatha) from East Africa. *European Journal of Entomology*, 95: 217-237.

Recibido: 30 noviembre 1999.
Aceptado: 23 junio 2000.