Similarity of Chinese *Pseudosinella hui* sp. nov. (Collembola: Entomobryidae) to European and North American Species[1]

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Abstract A new collembolan species, *Pseudosinella hui,* is described from a cave in Guilin, Guangxi, China. The species is most similar to a group of four European and one Nearctic species characterized by a ciliate labial M1 macrochaeta and lack of seta *a* on the second abdominal segment. They share a number of features including presence of eyes and lack of thoracic macrochaetae.

Key Words new species, *Pseudosinella, hui,* Collembola, Entomobryidae, China, cave

The biospeleology of the very large number of Chinese caves is poorly known. This is particularly true of the small arthropods, including Collembola. Three new troglobite species of the genus *Sinella* and two of the genus *Pseudosinella* were described recently from Chinese caves (Chen, J-X. and K. Christiansen 1993, Chen et al. 2002). Three of the five species were discovered in the extensive Guilin cave system in 1990.

The genus *Pseudosinella* is one of the largest and most widespread collembolan genera. More than 280 species have been described but, prior to this paper, only 6 species were known from China: *P. tridentifera* (Rusek 1971), *P. bellingeri* (Wang et al. 2002c), *P. sexoculata* (Wang et al. 2002a), *P. caoi* (Chen et al. 2002) and *P. tumula* (Wang et al. 2002b). Herein, we describe a second new species of the genus *Pseudosinella* from a cave in Guilin, Guangxi, China. This species is of particular interest because it is more similar to European and North American species than to other Asiatic forms.

Materials and Methods

This study is based on materials collected by K. C. while at the Karst Laboratory at Guilin. Nine caves were explored; four of these yielded Collembola. No cave yielded more than one species. The specimens of the species described herein were found only in the cave depths of one of these caves. The specimens were collected in 90% alcohol with aspirators and later mounted in Faure's medium.

Holotype. female P. R. China: Guangxi: Guilin: Tai Ping Yan, VII-2-1990, collection number 8195, Christiansen and Cao Jianhua collectors.

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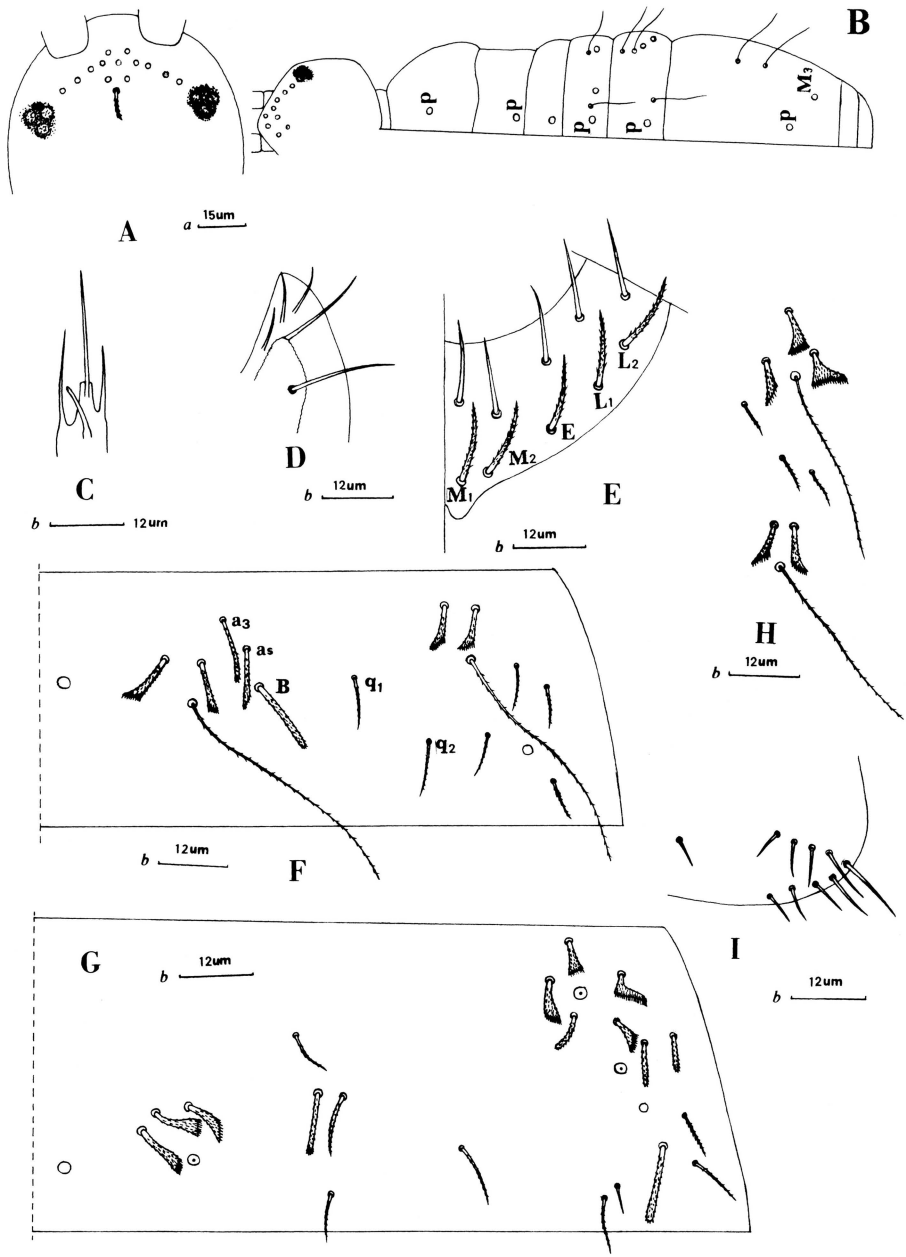

Fig. 1. *Pseudosinella hui,* sp. nov. A. semi-diagrammatic cephalic chaetotaxy; B. semi-diagrammatic body chaetotaxy; C. outer differentiated seta of labial appendage; D. maxillary palp; E. labial triangle; F. chaetotaxy of Abd. II; G. chaetotaxy of Abd. III; H. trichobothrial complex of Abd. IV; I. trochanteral organ.

Paratypes. 6 females, same locality and date. All specimens deposited in Nanjing University's Museum of Natural History, China.

Diagnosis. This species is distinguished from all congeners, using the Szeptycki (1979) nomenclature system, by the setae a_s and a_3 above seta *B,* on the second abdominal segment being truncate or blunt, finely ciliate mesochaetae.

Description

Color white except for eyepatches. Maximum body length 0.82 mm. Scales hyaline, oval to circular, and absent from antennae and legs.

Eyes 3+3, two in front and one close behind with clear cornea visible (Fig. 1A, B). Antennae 1.15 to 1.28 times as long as cephalic diagonal; segment ratios as shown in Table 1. Ant. IV lacking apical bulb; apical organ of Ant. III not clearly seen. Labral setae 4-5-5-4, prelabral setae ciliate, remainder smooth, labral intrusion V-shaped and labral papillae absent. Outer differentiated seta of labial appendage curved inwards, tip nearly reaching or slightly surpassing apex of same papilla (Fig. 1C). Subapical seta of outer maxillary palp slightly longer than or subequal to apical seta, sublobular plate with 3 smooth hairs (Fig. 1D).

Thoracic "collar" with 3 to 4 rows of heavy truncate ciliate setae. Body macrochaetae as shown in Table 2 and Fig. 1A. Chaetotaxy of labium base: M_1-M_2-0-E-L_1-L_2, all setae ciliate (Fig. 1E). 3 + 3 ciliate marginal macrochaetae along labial ventral groove. Abd. II chaetotaxy 00Bq_1q_2 (after Gisin), setae p and a absent, macrochaeta B short, truncate and ciliate. Setae q_1 and q_2 ciliate, slender and acuminate (Fig. 1F). The two setae anterior to seta B slightly expanded, truncate, finely ciliate mesochaetae. Abd. III chaetotaxy as shown in Fig. 1G. Abd. IV with 1 median macrochaeta M_3; anterior bothriotricha complex lacking macrochaeta P_1 and supplementary seta (Fig. 1H).

Trochanteral organ with 9 setae in arms and 1 external seta, all smooth (Fig. 1I). Inner differentiated setae of tibiotarsus ciliate. Outstanding inner macrochaeta of hind tibiotarsus slightly longer than other large setae but apically blunt and club-like (Fig. 2A), located at 30 to 37 percent of the distance from base to apex. Unguis with 3 inner teeth, basal pair subequal, median tooth located at 46 to 50 percent of the distance from base to apex of unguis and close to basal teeth. Unguiculus acuminate without outer tooth. Tenent hair acuminate, shorter than inner edge of unguis (Fig. 2B).

Table 1. Measurements (in mm) of *Pseudosinella hui,* sp. nov

Specimen	C.D.*	Ant. I	Ant. II	Ant. III	Ant. IV.	Antennal segmen ratios (I:II:III:IV)	Ant./head
8195-2	.160	.020	.050	.048	.093	1:2.50:2.0:4.63	1.29
8195-3	.146	.025	.050	.046	.082	1:2.40:2.20:4.0	1.37
8195-5	.143	.025	.050	—	—	1:2.0	—
8195-7	.158	.025	.040	.037	.073	1:1.60:1.47:2.93	1.10

* Cephalic diagonal.

Table 2. Characteristics of species similar to *Pseudosinella hui*

Species	hui	heteromurina	problematica	ops	paprivata	racoviitzai
Dorsal Cephalic macrochaeta S	–	+	+	–	–	–
Dorsal Cephalic macrochaeta T	–	+	+	–	–	–
Ventral labial seta M2*	4	3	4	3	4	4
Ventral labial seta R*	5	4	4	2	5	5
Ventral labial seta E*	4	3	4	3/4	4	4
Ventral labial seta L1*	4	3	4	4	4	4
Ventral labial seta L2*	4	3	4	4	4	4
Second abdominal seta P	–	+	+	+	–	+
Second abdominal seta Q1	2	5	5	2	1	5
Second abdominal seta Q2*	2	1	1	5	1	1
Anterior lateral (P) fourth abdominal seta	–	+	+	–	+	+
Fourth abdominal segment supplementary seta	–	–	–	+	+	–
Tenent hair shape; ac = acuminate, cl = clavate	ac	ac	cl	cl	cl	ac
Number of inner ungual teeth	3	3	3	3	4	3
Unguiculus tooth	–	+	+	–	–	+
Unguiculus shape : acuminate = 1, truncate = 2, basally swollen = 3	1	3	2	1	1	3

Table 2. Continued.

Species	hui	heteromurina	problematica	ops	paprivata	racoviitzai
Number of eyes per side	3	4-6	6	3	1-3	6
Inner manubrial plaque setae	2	2	?	2	?	?
Outer manubrial plaque setae	2	7	?	6-8	0	?
Habitat : cave = C, surface = S, cave and surface = CS	C	C	CS	C	S	C
Region: Europe + N. Africa = 1, North America = 2, Asia = 3	3	1	2	1	1	1
Maximum length (in mm)	.75	2.5	1.9	2.2	.6	2.4
Distance from distal unpaired tooth to base of unguis % of total length	46-50	54	63-65	50-60	87	55
Dorsal cephalic macrochaeta R3	–	–	–	–	?	–

* 1 = smooth microchaeta; 2 = ciliate microchaeta; 3 = smooth macrochaeta; 4 = ciliate macrochaeta; 5 = absent.

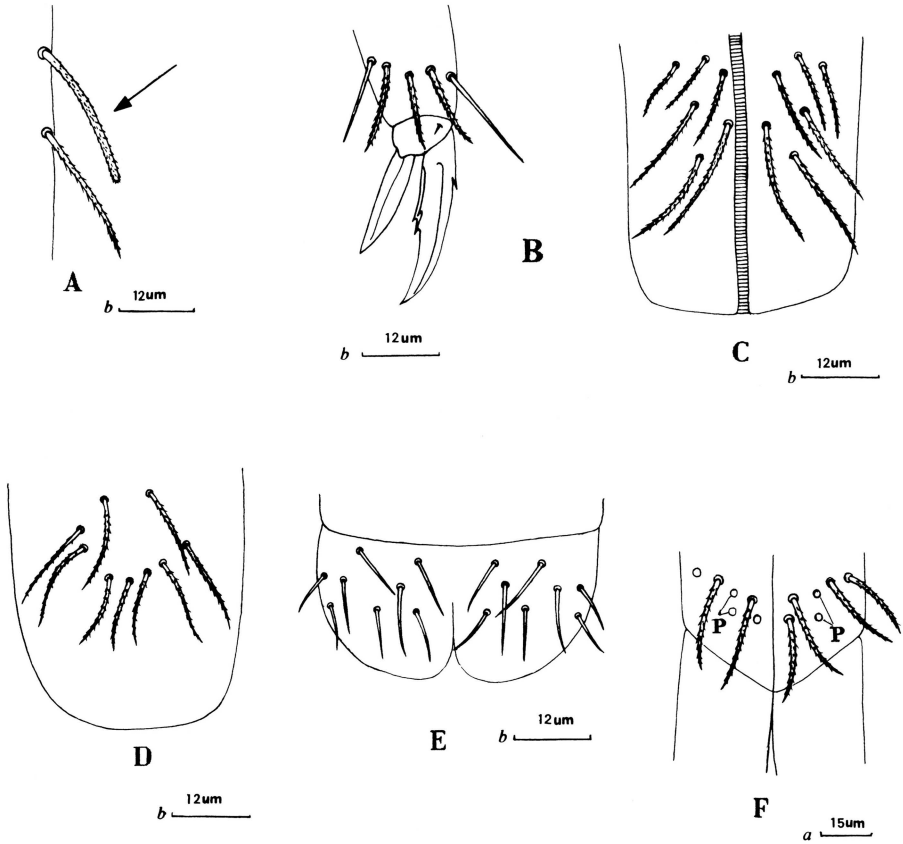

Fig. 2. *Pseudosinella hui*, sp. nov. A. inner differentiated tibiotarsal setae; B. hind foot complex; C. anterior face of ventral tube; D. posterior face of ventral tube; E. lateral flap of ventral tube; F. manubrial plaque.

Ventral tube unscaled; with 6(5) + 6(5) ciliate setae of different sizes on anterior face (Fig. 2C), 8 or 9 slender ciliate setae on posterior (Fig. 2D), and 6 to 8 smooth setae on each lateral flap (Fig. 2E).

Manubrium and dentes ventrally scaled. Manubrial plaque with 2 inner and 2 outer ciliate setae (Fig. 2F). Uncrenulate dens 1.0 to 1.42 times length of mucro. Mucro with subapical tooth slightly smaller than apical one, basal spine just attaining apex of subapical tooth. Manubrium without smooth setae. Male genital plate not seen.

Habitat. Found on organic debris and water surfaces in totally dark areas of the cave.

Etymology. Named after Mr. Hu Mengyu whose help was invaluable to us in making the collections for this work.

Discussion

There are only a few species in the genus *Pseudosinella* having labial seta M_1 ciliate and lacking seta a on abdominal segment 2. All species of the group have eyes,

and have labial setae other than R macrochaetae, mostly ciliate. Seta M_1 is always a ciliate macrochaeta. All lack posterior thoracic macrochaetae, have 3 or 4 inner ungual teeth, and have R_0 and R_1 Cephalic macrochaetae but differ from each other in other respects. All previously described species occur in Europe or North America. *Pseudosinella hui* differs from all other species of this group by having only a single M seta on abdominal segment 4 and lacking macrochaeta M_2 on the head. It also differs in having the distal ungual tooth more basal. Even more remarkable is the nature of the two setae (setae a_s and a_3 in the Szeptycki system) anterior to seta B on abdominal segment 2. In all other species known to us, they are smooth or sparsely ciliate, acuminate microsetae or short "fan-shaped" setae. In *P. hui* they are densely finely ciliate, truncate or blunt mesochaetae (Fig. 1F).

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