



Formosan Entomologist

Journal Homepage: entsocjournal.yabee.com.tw

Two New Species of the Genus *Berberentulus* Tuxen (Protura: Acerentomidae) from Taiwan 【Research report】

臺灣產槩蚘屬(原尾目：蚘科)二新種【研究報告】

Ren-Fang Chao and Chin-Seng Chen*
趙仁方、陳錦生*

*通訊作者E-mail: [✉ Berberentulus, taxonomy, Taiwan.](mailto:Berberentulus@yabee.com.tw)

Received: 1999/04/16 Accepted: 1999/05/14 Available online: 1999/09/01

Abstract

Berberentulus neipuensis n. sp. was formerly identified as *B. travassosi* (Silvestri, 1938). After comparing the female genitalis and the characters of the foretarsus with the original description and specimen, we determined it to be a new species. Another new species in Taiwan, *B. huisunensis* n. sp., is also described in this paper. A key to species, detailed descriptions, diagnosis, and distribution of these two species are included in the present paper.

摘要

內埔槩蚘 (*Berberentulus neipuensis* n. sp.) 過去被鑑定為崔氏槩蚘 (*B. travassosi*)，經過比對雌性外生殖器官和前跗節的特徵後，作者等發現應該屬於一新種。此外，文中描述臺灣產另一新種——惠蓀槩蚘 (*B. huisunensis* n. sp.)。文中包含種檢索表、種類的描述、鑑別特徵及分佈。

Key words: *Berberentulus*, taxonomy, Taiwan.

關鍵詞: 槩蚘屬、分類、臺灣

Full Text: [PDF\(0.27 MB\)](#)

下載其它卷期全文 Browse all articles in archive: <http://entsocjournal.yabee.com.tw>

Two New Species of the Genus *Berberentulus* Tuxen (Protura: Acerentomidae) from Taiwan

Ren-Fang Chao and Chin-Seng Chen* Department of Biology, Tunghai University, Taichung 40704, Taiwan, R.O.C.

ABSTRACT

Berberentulus neipuensis n. sp. was formerly identified as *B. travassosi* (Silvestri, 1938). After comparing the female genitalis and the characters of the foretarsus with the original description and specimen, we determined it to be a new species. Another new species in Taiwan, *B. huisunensis* n. sp., is also described in this paper. A key to species, detailed descriptions, diagnosis, and distribution of these two species are included in the present paper.

Key words: *Berberentulus*, taxonomy, Taiwan.

Introduction

Only one species of the genus *Berberentulus* Tuxen, 1963 was previously recorded in Taiwan by Lee and Chen (1990). Recently we re-examined the single specimen of *Berberentulus* collected by Ms. Lee and found that the identification as *B. travassosi* was incorrect. Further examination and comparison with recently collected specimens reveal that it is a new species. A second new species of *Berberentulus* was also found from Taiwan. The taxonomic treatment and terminology used in this paper follow those of Chao and Chen (1996). All specimens (including types) are deposited in the Department of Biology, Tunghai University, Taiwan.

Key to *Berberentulus* species in Taiwan

1. Position of sensillum d higher than those of sensillum b and c; apex of acrostylus closed.....*B. neipuensis*
- . Positions of sensilla b, c, and d parallel; apex of acrostylus separated.....*B. huisunensis*

Berberentulus huisunensis sp. nov.

(Fig. 1, Table 1)

Female: body length 1080~1400 μm .
Head: elliptical, length 146~160 μm , width 92~105 μm , L1=1.4~1.6. Pseudoculus circular, with longitudinal striae and 2 long elliptical appendages below, 8~9 \times 9~10 μm , PR=16.6~17.4. Labial palpus with a sensillum and 3 setae. Canal of maxillary gland (filamento di sostegno) with cup-shaped calyx and

*Correspondence/reprint request address

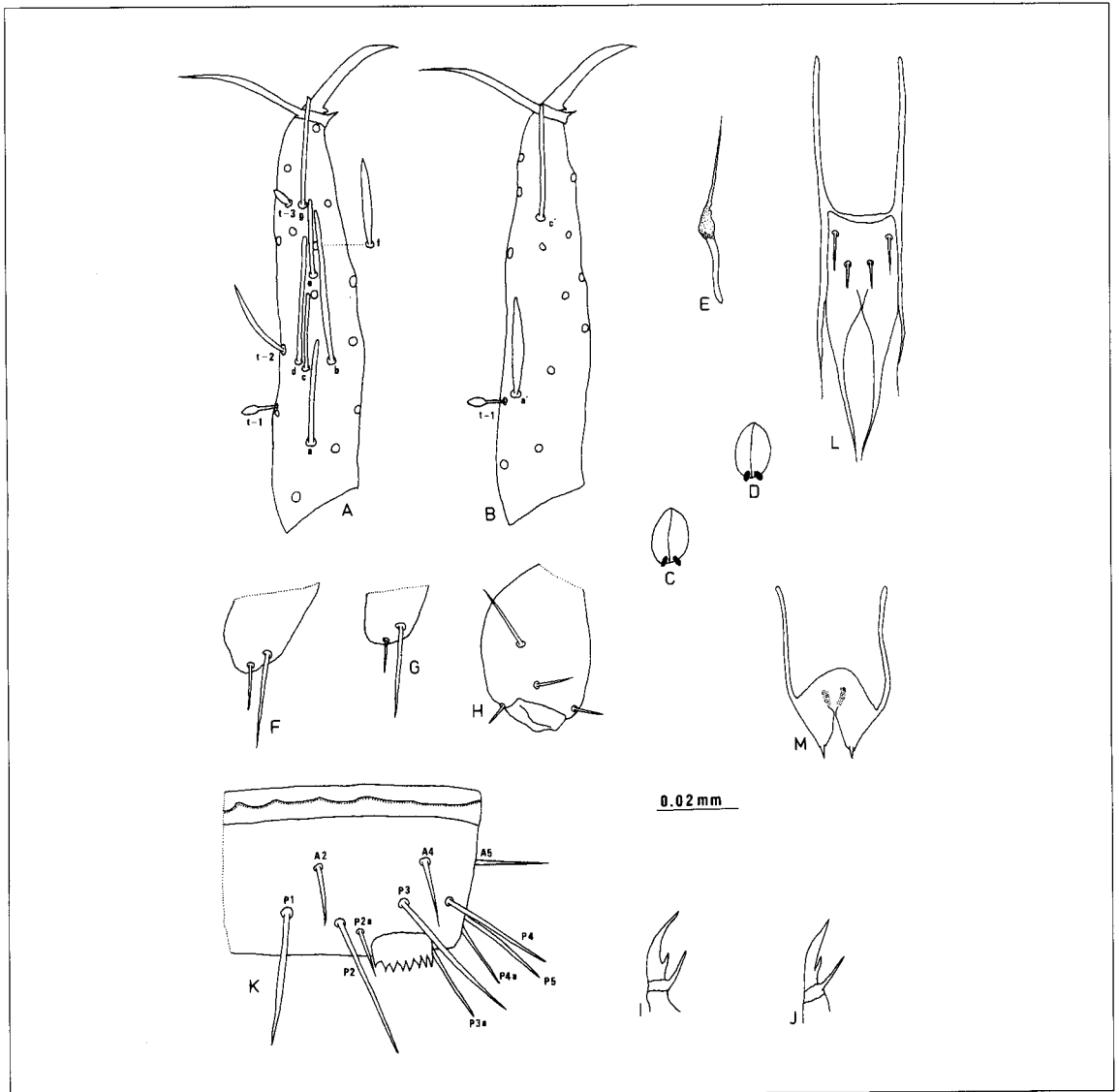


Fig. 1. *Berberentulus huisunensis*, n. sp. A. Exterior side of foretarsus; B. Interior side of foretarsus; C-D. Pseudoculus; E. Canal of maxillary gland; F. Abdominal leg I; G. Abdominal leg II; H. Abdominal leg III; I. Distal end of middle tarsus; J. Distal end of hind tarsus; K. Tergite VIII; L. Male squama genitalis; M. Female squama genitalis.

helmet-shaped appendage, no dilatation and partition in blind end of canal. **Thorax:** foretarsus length 98~112 μm , claw length 22~24 μm , with 1 tooth near base of claw, TR=4.5~4.8; empodium length 2~3 μm , EU=0.10~0.12. Sensilla t-1 claviform, BS=0.44~0.52; t-2 long, linear; t-3 shuttle-like. Exterior sensilla a,

b, c, and d long, linear, b, c, and d parallel in position, b long, apex of b reaching base of β_6 , base of c and d closed, apex of c lower than base of e; e, f, and g linear, f obvious dilatation, apex of g surpassing base of empodium. Interior sensilla a' obvious dilatation, base of a' slightly higher in position than t-1; b'

Table 1. Chaetotaxy of *Berberentulus huisunensis* n. sp.

		Formula	Complementary setae
Dorsal			
Thorax			
	I	6	A1, 1a, 2
	II-III	4-2/16	A2, 4, M P1, 1a, 2, 2a, 3, 4, 4a, 5
Abdomen			
	I	6/10	A1, 2, 5 P1, 2, 2a, 3, 5
	II-VII	6/16	A2, 4, 5 P1, 1a, 2, 2a, 3, 4, 4a, 5
	VIII	6/16	A2, 4, 5 P1, 2, 2a, 3, 3a, 4, 4a, 5
	IX	14	
	X	12	
	X I	6	
	X II	9	
Ventral			
Thorax			
	I	4-4/6	A1, 2, M1, 2 P1, 2, 3
	II-III	7-2/4	Ac, 2, 3, 4, M P2, 3
Abdomen			
	I	3/2	Ac, 2 P1
	II-III	3/5	Ac, 2 Pc, 2, 3
	IV-VII	3/8	Ac, 2 P1, 1a, 2, 3
	VIII	4/0	A1, 2
	IX-X	4	
	X I	6	
	X II	6	

absent; c' linear, apex of c' reaching base of empodium. Middle tarsus length 52~54 μm , claw length 16~17 μm ; hind tarsus length 56~59 μm , claw length 16~18 μm . **Abdomen:** chaetotaxy as shown in table 1. Abdominal appendage I with terminal vesicle and 4 setae; abdominal appendages II-III with 2 setae each, no terminal vesicle, apical seta of these appendages shorter than subapical one. Striate band on abdomen VIII reduced;

comb on both sides of tergite VIII oblong, hind margin with 12~13 teeth. Squama genitalis with pointed acrostylus; apex of acrostylus separated.

Male: characters of foretarsus and chaetotaxy on thorax and abdomen similar to those of female. Squama genitalis with pointed acrostylus.

Maturus junior: body length 985~1020 μm . Foretarsus length 86~98 μm , characters of foretarsus and chaetotaxy

on thorax and abdomen similar to those of female. Chaetotaxy as shown in table 1.

Larva II and I: unknown.

Specimens examined: Holotype ♀, NANTOU: Huisun 450 m, 6-XI-1994, R. F. Chao. Paratypes: 2 ♀, 1 Maturus junior, same data as holotype. HSINCHU: Chinhshien Forest Recreation Area 750 m, 3 ♀, 6-VII-1995, R. F. Chao. TAICHUNG: Pahsienshan 750 m, 2 ♀, 30-XI-1994, R. F. Chao; Anmashan 1,800 m, 2 ♀, 4 ♂, 6-III-1996, R. F. Chao; Wuling 1,800 m, 2 ♀, 4 ♂, 4-VII-1996, R. F. Chao. NANTOU: Lushan 1,200 m, 1 ♀, 11-XII-1995, R. F. Chao.

Distribution: Taiwan.

Etymology: The specific name is derived from the local name, Huisun, of the type locality.

Remarks: The position of foretarsus sensilla in this species resemble those of *Berberentulus ovei* Tuxen, 1976 (Tuxen, 1976), but the two species can be differentiated by the length of interior sensillum e and the position of exterior sensillum a'. The length of interior sensillum e surpasses the base of empodium in this new species, but that of *B. ovei* only reaches the base of the empodium. The position of sensilla a' and t-1 are almost parallel in *B. ovei*, whereas the position of sensillum a' of *B. huisunensis* is higher than that of sensillum t-1. In addition, the dilated sensillum f and the claw with one tooth near the base of *B. huisunensis* are unique among all species of *Berberentulus* in the world. On the other hand, the short sensillum c is also another major character of *B. huisunensis*. The apex of sensillum c is lower than the base of sensillum e in this species. The same character is also found in *B. samchonri* Imadate et Szeptycki, 1976 (Imadate and Szeptycki, 1976), but other characters of the foretarsus are different. The species is distributed mainly in central Taiwan.

***Berberentulus neipuensis* sp. nov.**

(Fig. 2, Table 2)

Berberentulus travassosi (Silvestri, 1938): Lee and Chen, 1990. Yushania 7: 37~38. (misidentification)

Female: body length 1100~1280 μm .

Head: elliptical, length 120~135 μm , width 75~80 μm , L1=1.5~1.7. Pseudoculus circular, with longitudinal striae and 2 long elliptical appendages below, 9~10 \times 10~12 μm , PR=11~13. Labial palpus with a sensillum and 3 setae. Canal of maxillary gland with cup-shaped calyx and helmet-shaped appendage, no dilatation and partition in blind end of canal. **Thorax:** foretarsus length 94~98 μm , claw length 18~26 μm , TR=3.6~4.1; empodium length 3 μm , EU=0.12~0.16. Sensilla t-1 claviform, BS=0.49~0.51; t-2 linear; t-3 small, shuttle-like. Exterior sensilla a, b, c, and d long, linear, b and c parallel in position, base of d obviously higher than bases of b and c; e, f, and g long, linear, apex of e reaching base of γ 4. Interior sensilla a' linear, obvious dilatation, base of a' higher in position than t-1; b' absent; c' thin, linear. Middle tarsus length 43~45 μm , claw length 14~16 μm ; hind tarsus length 45~49 μm , claw length 16~19 μm . **Abdomen:** chaetotaxy as shown in table 2. Abdominal appendage I with terminal vesicle and 4 setae; abdominal appendages II-III with 2 setae each, no terminal vesicle, apical seta of these appendages shorter than subapical one. Striate band on abdomen VIII reduced; comb on both sides of tergite VIII oblong, hind margin with 7~8 teeth. Squama genitalis with pointed acrostylus; apex of acrostylus very close.

Male: characters of foretarsus and chaetotaxy on thorax and abdomen similar to those of female. Squama genitalis with pointed acrostylus.

Maturus junior: body length 955~980 μm . Foretarsus length 76~78 μm , characters of foretarsus and chaetotaxy on thorax and abdomen similar to those of female. Chaetotaxy as shown in table 2.

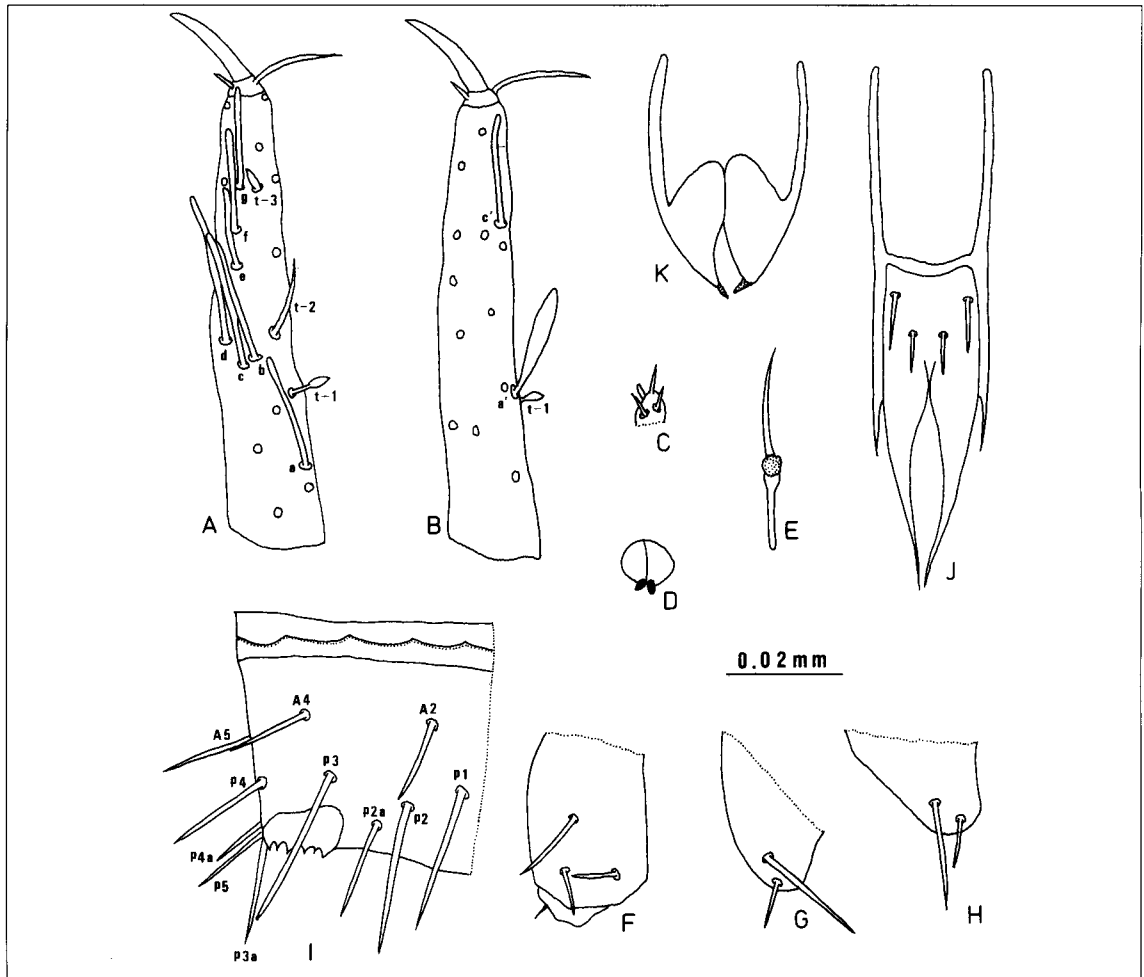


Fig. 2. *Berberentulus neipuensis*, n. sp. A. Exterior side of foretarsus; B. Interior side of foretarsus; C. Labial palpus; D. Pseudoculus; E. Canal of maxillary gland; F. Abdominal leg I; G. Abdominal leg II; H. Abdominal leg III; I. Tergite VIII; J. Male squama genitalis; K. Female squama genitalis.

Larva II and I: unknown.

Specimens examined: Holotype ♀, PINGTUNG: Neipu, Natl. Pingtung Sci. and Tech. Univ. 60 m, 23-VI-1994, R. F. Chao. Paratypes: 10 ♀, 1 Maturus junior, same data as holotype. KAOHSIUNG: Huangtiehtsuiku 100 m, 1 ♀, 26-VII-1988, H. R. Lee; Liukuei 300 m, 4 ♀, 1 Maturus junior, 7-IV-1995, R. F. Chao. Yenping 700 m, 1 ♀, 18-IX-1996, R. F. Chao. PINGTUNG: Nanrenshan 400 m, 2 ♀, 29-IX-1997, Y. W. Pan; Tungyuan Forest Recreation Area 250 m, 1 ♀, 1 ♂, 2

Maturus junior, 21-XI-1995, R. F. Chao.

Distribution: Taiwan.

Etymology: The specific name is derived from the local name, Neipu, of the type locality.

Remarks: The major character of this species is the morphology of the female genitalis. The acrostylus is very close and it looks like a conical appendage. The female genitalis of this species is very similar to that of *B. travassosi* (Tuxen, 1976). But the characters of the foretarsus are different between these two

Table 2. Chaetotaxy of *Berberentulus neipuensis* n. sp.

	Maturus junior		Imago	
	Formula	Composition of setae	Formula	Complementary setae
Dorsal				
Thorax				
I	4	A1, 2	4	
II-III	6/16	A1, 2, 3 P1, 1a, 2, 2a, 3, 4, 5, 5a	8/16	A4
Abdomen				
I	4/12	A1, 2 P1, 2, 2a, 3, 4, 5	6/12	A5
II	6/14	A1, 2, 5 P1, 2, 2a, 3, 4, 4a, 5	6/16	Pla
III-VI	6/16	A1, 2, 5 P1, 1a, 2, 2a, 3, 4, 4a, 5	6/16	
VII	6/14	A2, 4, 5 P1, 2, 2a, 3, 4, 4a, 5	6/16	Pla
VIII	6/15	A2, 4, 5 Pc, 2, 2a, 3, 3a, 4, 4a, 5	6/16	-Pc, +P1
IX	12		14	
X	8		12	
X I	6		6	
X II	9		9	
Ventral				
Thorax				
I	4-4/6	A1, 2, M1, 2 P1, 2, 3	4-4/6	
II-III	7-2/4	Ac, 1, 2, 3, M P1, 2	7-2/4	
Abdomen				
I	3/2	Ac, 2 P1	3/4	P2
II-III	3/5	Ac, 2 Pc, 1, 2	3/5	
IV-VII	3/8	Ac, 2 P1, 1a, 2, 3	3/8	
VIII	4/0	A2 Pc, 1, 1a, 2	4/0	
IX	4		4	
X	4		4	
X I	2		6	
X II	6		6	

species. The bases of exterior sensilla b, c, and d of *B. travassosi* are almost parallel in position, but sensillum d of *B. neipuensis* is obviously higher than sensilla b and d in position which is

similar to *B. hagmannarum* Tuxen, 1976 (Tuxen, 1976). Besides, the chaetotaxy of abdomen terga VI is also different between *B. neipuensis* and *B. travassosi*. Therefore, *B. neipuensis* and *B. travassosi*

are different species. *B. neipuensis* was only found in southern Taiwan.

References

Chao, R. F., and C. S. Chen. 1996. The genus *Eosentomon* of Taiwan (Protura: Eosentomidae). *Chinese J. Entomol.* 16: 303-321.

Imadate, G., and A. Szeptycki. 1976. The proturans from North Korea. *Bull. Nat. Sci. Mus. Ser. A (Zool.)* 2(4): 267-276.

Lee, H. R., and C. S. Chen. 1990. A study of Berberentomidae (Insecta: Protura) from Taiwan. *Yushania* 7: 29-43 (In Chinese with English abstract).

Tuxen, S. L. 1976. The Protura (Insecta) of Brazil, especially Amazonas. *Amazoniana* 5: 417-463.

Received Apr. 16, 1999

Accepted May 14, 1999

臺灣產槩蚘屬(原尾目：蚘科)二新種

趙仁方 陳錦生* 東海大學生物系 台中市西屯區中港路三段 181 號

摘 要

內埔槩蚘 (*Berberentulus neipuensis* n. sp.) 過去被鑑定為崔氏槩蚘 (*B. travassosi*)，經過比對雌性外生殖器官和前跗節的特徵後，作者等發現應該屬於一新種。此外，文中描述臺灣產另一新種—惠蓀槩蚘 (*B. huisunensis* n. sp.)。文中包含種檢索表、種類的描述、鑑別特徵及分佈。

關鍵詞：槩蚘屬、分類、臺灣。