

Two new species of the genus *Kenyentulus* TUXEN, 1981 from Shaanxi Province, Northwest China (Protura: Berberentulidae)

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Abstract. Two new species, *Kenyentulus shaanxiensis* sp. n., and *Kenyentulus louguanensis* sp. n. are described from Shaanxi Province, Northwest China. All type specimens are deposited in Shanghai Entomological Museum, Institute of Plant Physiology & Ecology, Chinese Academy of Sciences.

Key words: Protura, Berberentulidae, *Kenyentulus*, new species, Shaanxi, China.

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I. INTRODUCTION

In June 2006, soil fauna survey of Shaanxi Province, Northwest China has been carried out, and many specimens of *Kenyentulus* were collected. Among them, two unknown species were identified and they are described in the present paper as new to science. We dedicate this paper to Professor Andrzej SZEPTYCKI, the well-known biologist from Poland for his great contribution to the knowledge of Protura in the world.

II. DESCRIPTIONS

Kenyentulus TUXEN, 1981

Type species: *Kenyentulus kenyanus* (CONDE, 1948)

Diagnosis. Abdominal legs II and III each with one segment, each with one short apical seta and long subapical seta. Labial palpus reduced, with one sensillum and three setae. Calyx smooth and proximal canal of maxillary gland with two or three beady widenings. Sensillum *t-1* on foretarsus claviform. Sensillum *b* very short. Sete *Pl_a* on urotergites II-VI is very close to *Pl*. Urosternite VIII with 4 setae. Acrostyli of female squama genitalis pointed.

Remark. Up to the present, 40 species of *Kenyentulus* were reported in the world and 29 species known from China (YIN 1999; SZEPTYCKI 2007).

1. *Kenyentulus shaanxiensis* sp. n.

(Figs 1-10)

Description. Male. Body length 850-963 μm ($n=3$).

Head – Elliptic, length 95-100 μm , width 70-87 μm ($n=3$). Additional seta absent, seta ls short. Rostrum not protruded (Fig. 1). Pseudoculus almost circular, length 5-6 μm , width 7-8 μm . PR=16-20 (Fig. 2). Hind part of maxillary gland length 22-27 μm , with two beady widening, CF=3.7-4.5 (Fig. 3). Maxillary palpus with two seta-like sensilla, subequal (Fig. 4). Labial palpus reduced, with three setae and one short parallel-sided sensillum (Fig. 5)

Thorax – Chaetotaxy as shown in Table 1. Length ratio of *P1*: *P1a*: *P2* on mesonotum as 9-12: 1: 14-18. Pronotum with no pores, mesonotum and metanotum with pore sl and l, sterna without pores. Foretarsal length 76-89 μm , claw length 20-26 μm , TR=3.4-3.9; Empodium short, EU=0.23-0.25; Dorsal sensillum *t-1* claviform, BS=0.43-0.56; *t-2* long and thin; *t-3* gemmiform. Exterior sensillum *a* broad, reaching base of *e*; *b* short, surpassing base of seta γ_2 ; *c* longer than *d*, *d* reaching base of *f*; *e* and *f* thin and long, reaching base of claw; *g* short. Interior sensillum *a'* robust, same level of *t-1*; *b'* and *c'* slim; *c'* surpassing base of claw. Length formula of foretarsal sensilla as: $t-3 < t-1 < b < g < a' < b' < t-2 < d = c' < e = f < c < a$ (Figs 8-9). Middle tarsal length 37-40 μm , claw length 16-18 μm , hind tarsal length 40-50 μm , claw length 16-20 μm .

Abdomen – Chaetotaxy as shown in Table 1. Abdominal tergite I with 6/14 setae, with posterior seta *P1a'*. Urotergites II-VI with three pairs of anterior setae (*A1*, *A2* and *A5*), posterior setae *P1a* and *P3a* present, with chaetotaxy 6/20. Urotergite VII with three pairs of anterior setae (*A2*, *A4* and *A5*), posterior seta *P1a'* absent. Urosternites IV-VII with chaetotaxy 3/8. Urotergite I with pore *psm*, other pores absent. Urotergites II-VII with pores *al* and *psm*, with no pores *psl* and *l*. Urotergite VIII with pores *psm*. Urosternites I-IV without pores, V-VII each with 1 pair of pores, IX-XI without pores. Urotergite XII with a single middle pore, sternite with 1 pair of pore *al*.

Abdominal legs II and III each with two setae, subapical seta about 2.4-2.5 times the length of apical one. Striate band on abdominal segment VIII reduced (Fig. 7). Comb oblique rectangle, with 10-14 teeth on hind margin (Fig. 6).

Penis of male as shown in Fig. 10. Female unknown.

Holotype – Male (mounted) (No: S06164), from latifoliate forest of Mt. Cuihua, 33° 59' 394 N, 109° 00' 372 E, 1300m alt., Xi'an, Shaaxi Province, China, 8-VI-2006, collected by Dr. Yun-Xia LUAN, Yan GAO and Yun BU.

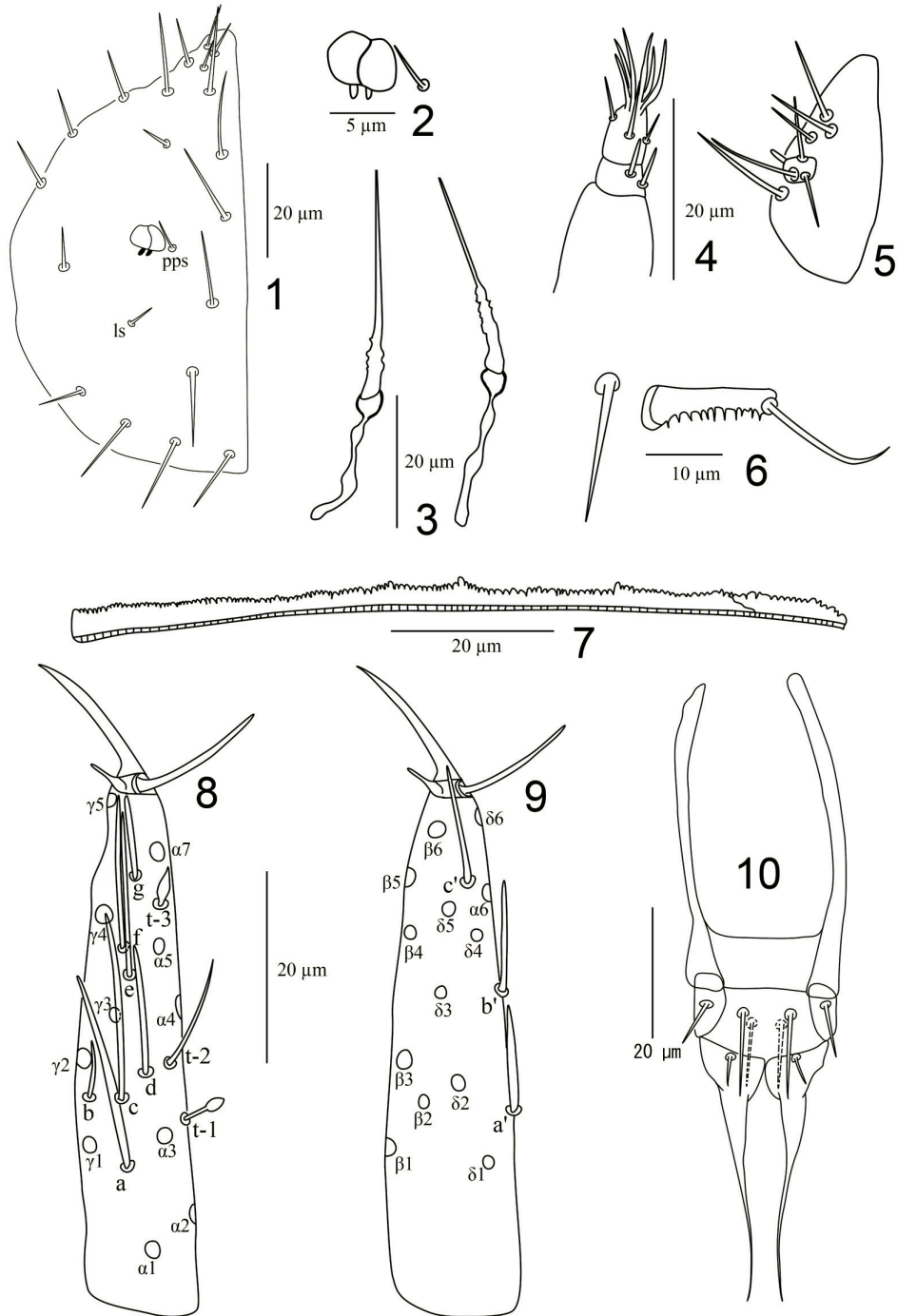
Paratypes – 2 males (mounted) (No: S06074 and S60165), same data as for holotype.

All type specimens are deposited in Shanghai Entomological Museum, Institute of Plant Physiology & Ecology, Chinese Academy of Sciences.

Etymology. The species name derived from the Shaanxi Province where the specimens were collected.

Distribution. Shaanxi Province, Northwest China.

Remarks. *Kenyentulus shaanxiensis* sp. n. is characterized by the 6/20 chaetotaxy on urotergites II-VI, with *P1a'* present and the 3/8 setae on urosternites IV-VII, as well as the reduced striate band on abdominal segment VIII. It is similar to *K. jinjiangensis* TANG et YIN, 1986, *K. hubeinicus* YIN, 1987 and *K. setosus* IMADATE et SO, 1992. It differs from *K. jinjiangensis* in the 6/20 chaetotaxy of urotergites II and III and reduced striate band, differs from *K. hubeinicus* in the chaetotaxy of urotergites II, III and VI and comb on abdominal VIII, differs from *K. setosus* in the chaetotaxy of urotergites II and IV-VI and maxillary gland.



Figs 1-10. *Kenyentulus shaanxiensis* sp. n. 1 – head, dorsal view; 2 – pseudoculus; 3 – canal of maxillary gland; 4 – maxillary palpus; 5 – labial palpus; 6 – comb on abdominal VIII; 7 – striate band on abdominal VIII; 8 – foretarsus, exterior view; 9 – foretarsus, interior view; 10 – penis.

Table 1

The chaetotaxy of *Kenyentulus shaanxiensis* sp. n.

	dorsal		ventral	
	formula	setae	formula	setae
torax				
I	4	1,2	$\frac{4-2}{6}$	A1,2,M1 P1,2,3
II	$\frac{6}{16}$	A2,4,M P1,1a,2,2a,3,4, 5,5a	$\frac{7-2}{4}$	Ac,2,3,4,M P1,2
III	$\frac{6}{16}$	A2,4,M P1,1a,2,2a,3,4, 5,5a	$\frac{7-2}{4}$	Ac,2,3,4,M P1,2
abdomen				
I	$\frac{6}{14}$	A1,2,5 P1,1a,1a',2,2a,3,5	$\frac{3}{4}$	Ac,2 P1,2
II-III	$\frac{6}{20}$	A1,2,5 P1,1a,1a',2,2a,3,3a,4,4a,5	$\frac{3}{5}$	Ac,2 Pc,2,3
IV-VI	$\frac{6}{20}$	A1,2,5 P1,1a,1a',2,2a,3,3a,4,4a,5	$\frac{3}{8}$	Ac,2 P1,1a,2,3
VII	$\frac{6}{18}$	A2,4,5 P1,1a,2,2a,3,3a,4,4a,5	$\frac{3}{8}$	Ac,2 P1,1a,2,3
VIII	$\frac{6-7}{8}$	A1,4,5,Mc,2,3,4 P2,3,4,5	$\frac{4}{0}$	A1,2
IX	14	1,1a,2,2a,3,3a,4	4	1,2
X	12	1,1a,2,2a,3,4	4	1,2
XI	4	2,3	6	1,2,3
XII	9		6	

2. *Kenyentulus louguanensis* sp. n.

(Figs 11-19)

Description. Male. Body length 840-855 μm (n=3).

Head – Elliptic, length 88-92 μm , width 70-87 μm (n=3). Additional seta present. Pseudoculus ovate, length 7 μm , width 5-6 μm . PR=12.6-13.2 (Fig. 11). Hind part of maxillary gland length 19-20 μm , with two beady widening, anterior part with some irregular protuberances, CF=4.4-4.7 (Fig. 12). Maxillary palpus with two filiform sensilla, subequal (Fig. 13). Labial palpus reduced, with three setae and one short sensillum (Fig. 14).

Thorax – Chaetotaxy as shown in Table 2. Length ratio of *PI*: *PIa*: *P2* on mesonotum as 3-5: 1: 4-6. Pronotum with no pores, mesonotum and metanotum with pore *sl* and *l*, sterna without pores. Foretarsal length 54-55 μm , claw length 13-14 μm , TR=3.9-4.2; Empodium short, EU=0.23-0.31; Dorsal sensillum *t-1* claviform, BS=0.57-0.59; *t-2* long and thin; *t-3* gemmiform. Exterior sensillum a robust, not reaching base of $\gamma 3$; *b* short, surpassing base of seta $\gamma 2$; *c*, *d*, *e* filiform, in similar

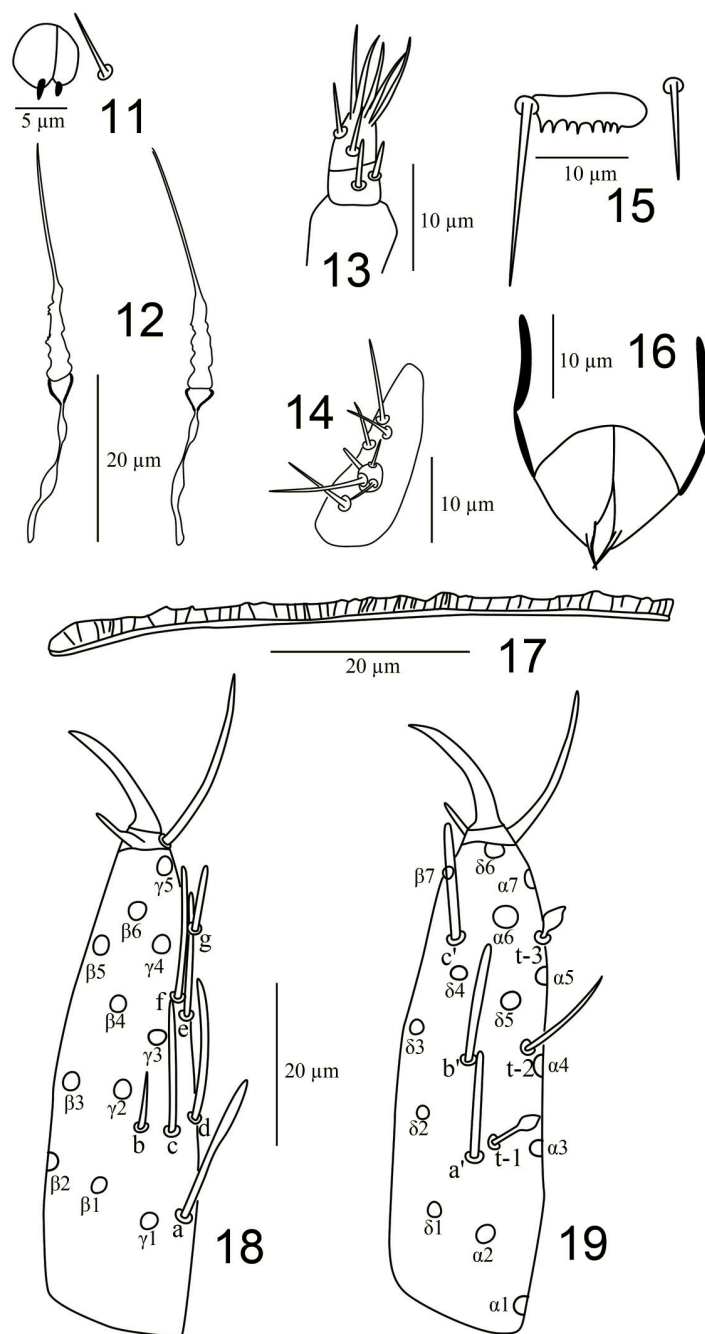
length; *g* short; Interior sensillum *a'* broad, lower than level of *t-1*; *b'* and *c'* broad; *b'* slightly surpassing base of $\delta 5$; *c'* surpassing base of claw. Length formula of foretarsal sensilla as: $t-3=g<t-1=b<a'<t-2<b'=c'<c=d=e=f<a$ (Figs 18-19). Middle tarsal length 21-23 μm , claw length 13-14 μm , hind tarsal length 24-25 μm , claw length 14-15 μm .

Table 2

The chaetotaxy of *Kenyentulus louguanensis* sp. n.

	dorsal		ventral	
	formula	setae	formula	setae
thorax				
I	4	1,2	$\frac{4-4}{6}$	A1,2,M1,2 P1,2,3
II	$\frac{6}{16}$	A2,4,M P1,1a,2,2a,3,4, 5,5a	$\frac{7-2}{4}$	Ac,2,3,4,M P1,2
III	$\frac{6}{16}$	A2,4,M P1,1a,2,2a,3,4, 5,5a	$\frac{7-2}{4}$	Ac,2,3,4,M P1,2
abdomen				
I	$\frac{6}{12}$	A1,2,5 P1,1a,2,2a,3,5	$\frac{3}{4}$	Ac,2 P1,2
II-III	$\frac{6}{16}$	A1,2,5 P1,1a,2,2a,3,4,4a,5	$\frac{3}{5}$	Ac,2 Pc,2,3
IV-V	$\frac{6}{16}$	A1,2,5 P1,1a,2,2a,3,4,4a,5	$\frac{3}{8}$	Ac,2 P1,1a,2,3
VI	$\frac{8}{16}$	A1,2,4,5 P1,1a,2,2a,3,4,4a,5	$\frac{3}{8}$	Ac,2 P1,1a,2,3
VII	$\frac{6}{16}$	A2,4,5 P1,1a,2,2a,3,3a,4,4a,5	$\frac{3}{8}$	Ac,2 P1,1a,2,3
VIII	$\frac{6-7}{8}$	A1,4,5,Mc,2,3,4 P2,3,4,5	$\frac{4}{0}$	A1,2
IX	14	1,1a,2,2a,3,3a,4	4	1,2
X	12	1,1a,2,2a,3,4	4	1,2
XI	6	1,3,4	6	1,2,3
XII	9		6	

Abdomen – Chaetotaxy as shown in Table 2. Urotergites II-V with three pairs of anterior setae (A1, A2 and A5), with chaetotaxy 6/16. Urotergite VII with three pairs of anterior setae (A2, A4 and A5). Urotergite I with pore *psm*, other pores absent. Urotergites II-VII with pores *al* and *psm*, with no pores *psl* and *l*. Urotergite VIII with pores *psm*. Urosternites I-IV without pores, V-VII each with 1 pair of pores, IX-XI without pores. Urotergite XII with a single middle pore, sternite with 1 pair of pore *al*.



Figs 11-19. *Kenyentulus louguanensis* sp. n. 11 – pseudoculus; 22 – canal of maxillary gland; 13 – maxillary palpus; 14 – labial palpus; 15 – comb on abdominal VIII; 16 – female squama genitalis; 17 – striate band on abdominal VIII; 18 – foretarsus, exterior view; 19 – foretarsus, interior view.

Abdominal legs II and III each with two setae, subapical seta about 2.2-2.6 times length of apical one. Striate band on abdominal segment VIII with sparse stripes (Fig. 17). Comb rectangle, width 4 times of length, with 8 teeth on hind margin (Fig. 15).

Female squama genitalis with pointed acrostyli (Fig. 16). Male unknown.

Holotype – Female (mounted) (No: S06153), from latifoliate forest of Louguan forest park, 34° 03' 443 N, 108 ° 19' 453 E, 650 m alt., Louguan, Zhouzhi, Xi'an, Shaaxi Province, China, 10-VI-2006, collected by Dr. Yun-Xia LUAN, Yan GAO and Yun BU.

Paratypes – 2 females (mounted) (No: S06151 and S60152), same data as for holotype.

All type specimens are deposited in Shanghai Entomological Museum, Institute of Plant Physiology & Ecology, Chinese Academy of Sciences.

E t y m o l o g y. The species name derived from the Louguan town where the type specimens were collected.

D i s t r i b u t i o n. Shaanxi Province, Northwest China.

R e m a r k s. *Kenyentulus louguanensis* sp. n. is characterized by the 8/16 chaetotaxy on urotergite VI, striate band with sparse stripes. It can be easily distinguished from any other species of the same genus by the chaetotaxy on urotergite VI. It is similar to *K. xingshanensis* YIN, 1987; but it can be distinguished by the chaetotaxy on urotergites VI and VII, by the shape of maxillary gland and the sensilla on foretarsus.

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