

# Study on Soil Microarthropods from Mt. Hanla in Cheju-do 1. Four New Species of Oribatid Mites at Sangumburi\*

## 제주도 한라산의 토양미소절지동물에 관한 연구 1. 산굼부리 産 날개응애 4 신종\*

Seong-Sik CHOI\*\*

崔 星 植\*\*

**ABSTRACT** The present work describes four new species of oribatid mites, which were collected from Sangumburi in Cheju-do, Korea. They were *Brasilobates sangumburiensis* sp. nov., *Xenillus multisetosus* sp. nov., *Nippobodes tamlaensis* sp. nov., and *Nippobodes chejuensis* sp. nov.

**KEY WORDS** Taxonomy, Acari, Oribatid mite, Korea

**초 록** 이 논문은 제주도의 산굼부리에서 채집된 날개응애 4 신종을 기재하였다. 신종은 산굼부리소매응애 (*Brasilobates sangumburiensis* sp. nov.), 털보곰보응애(*Xenillus multisetosus* sp. nov.), 탐라곰검둥이응애 (*Nippobodes tamlaensis* sp. nov.), 제주곰검둥이응애(*Nippobodes chejuensis* sp. nov.)이다.

**검색어** 분류, 응애목, 날개응애

### INTRODUCTION

Sangumburi, a volcano crater, located at Kyorae-ri, Chocheon-eup in Cheju-do is a sight spot which is designated as a natural monument no. 263 in Korea. The name came from "a hole formed at mountain". It is located 438 m above the sea level and cuplike in shape ; 140 m in depth, 600-650 m in diameter, and 273,317 m<sup>2</sup> in internal area. About 420 plant species are distributed at the inside slope of crater. The base, flatland without standing water, was used as a farmland and pasture in the past, but is thick with eulalia, bamboo, *Gerranium sibiricum*, etc. In addition, deer, badgers, reptiles, birds, insects, etc. are living there. Temperature, wind, and moisture, etc. of the inside of crater are quite different from those of the outside. Therefore, temperate, subtropical, the northernmost subtropical, and the south temperate vegetations are distributed differently along depths of the crater. Because

various factors such as geological feature, vegetation, and climate were peculiar, I gathered soil samples at there. The new 4 species were identified from oribatid mites collected.

### DESCRIPTION

Family Xylobatidae Balogh & Balogh, 1984  
Genus *Brasilobates* Pérez-Iñigo & Baggio, 1980  
*Brasilobates sangumburiensis* sp. nov.

산굼부리소매응애  
(Fig. 1)

Material examined. Holotype : Sangumburi, Kyorae-ri, Chocheon-eup, Cheju-do. 20-IV-1996. S.S.Choi. 30 paratypes : the same sample as the holotype. All specimens are deposited in the Lab. Pl. Protect., Coll. of Agr., Wonkwang Univ., Iksan, Korea.

Measurement. Body length : 532(568)592 μm, width

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\*\* : Dept. of Agronomy, Coll. of Agr., Wonkwang Univ., Iksan, 570-749, Korea.

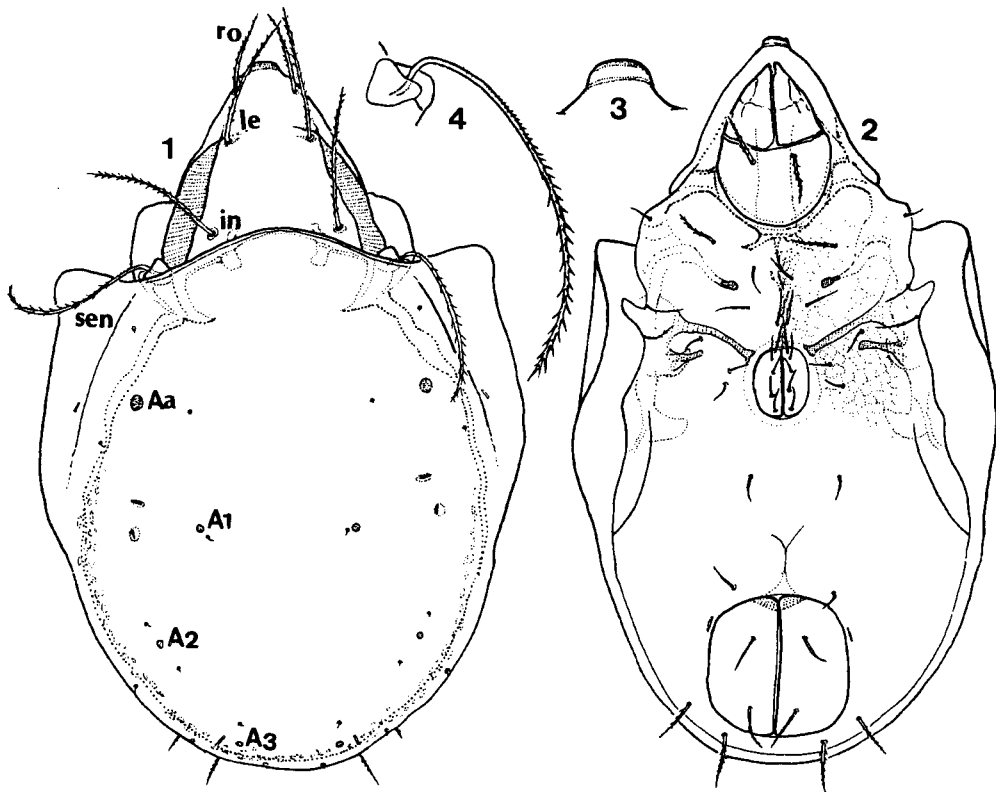


Fig. 1. *Brasilobates sangumburiensis* sp. nov., 1:Dorsal side, 2:Ventral side, 3:Rostral margin, 4:Sensillus.

: 280(299)320  $\mu$ m.

Colour. Yellowish brown.

Description. Prodorsum. Rostrum quadrangularly or roundly protruding (Fig. 1-3). Rostral, lamellar and interlamellar setae setiform and barbed. Length of *in* ca. 110  $\mu$ m, *le* ca. 100-102  $\mu$ m, and *ro* ca. 74-78  $\mu$ m. Sensillus filiform, long (ca. 140  $\mu$ m), thin, reclinate and spinose (Fig. 1-4). Interlamellar setae longer than their mutual distance. Lamellae well developed, converging and located laterally.

Notogaster. Surface smooth. Dorsosejugal suture convex. Ten pairs of notogastral setae minute and hardly discernible. Four pairs of area porosae present; *Aa* round and the largest. Remaining three pairs small and almost equal in size. *A1* about 120  $\mu$ m apart from each other, situated more inwards than *Aa* or *A2* and close to setae *lp*.

Ventral side. Setae *h* on mentum setiform, long, thick and barbed. Epimeral surface faintly network. Epimeral setal formula : 3-1-3-3; 1b long and barbed, 1a

and 1c smooth; their length 1b > 1a > 1c. 3a, 3c and 4c barbed. Anogenital setal formula : 5-1-2-3. Genital setae *g4* and *g5* barbed. Adanal setae *Ad1* (ca. 60  $\mu$ m) and *Ad2* (ca. 52  $\mu$ m) long, thick and barbed. *Ad3* (ca. 28  $\mu$ m) situated at preanal. All legs tridactylous.

Remark. Hitherto, six species of the genus *Brasilobates* Pérez-Iñigo & Baggio, 1980 are known in the world. They are *B. obtusus* (Mihelcic, 1956), *B. maximus* Mahunka, 1988, *B. spinosus* Fujita, 1989, *B. bipilis* Pérez-Iñigo & Baggio, 1980, *B. durbanensis* (Van Pletzen, 1963), and *B. punctata* Grobler, 1991. Among them, *B. spinosus* from Japan and *B. obtusus* from Spain are similar to this new species. But it differs from the latter species in the shape of rostrum, area porosae and ventral setae. *B. spinosus* from Japan differs from the new species by having a rounded rostrum and short, smooth *ad2*. *B. obtusus* from Spain is small (body length 365-375  $\mu$ m), mutual distance of area porosae *A1* is longer than that of *Aa* or *A2* and epimeral setae 1c are long and barbed.

Family Xenillidae Woolley et Higgins, 1966

Genus *Xenillus* Robineau-Desvoidy, 1839

*Xenillus multisetosus* sp. nov.

털보곰보응애

(Fig. 2)

Material examined. Holotype : Sangumburi, Kyorac-ri, Chocheon-eup, Cheju-do. 20-IV-1996. Soil litter collected by S.S.Choi. 2 paratypes : the same sample as the holotype. 1 ex.: Mt. Hanla, Chejudo. 25-V-1988. S. S.Choi. 1 ex.: Mt. Mai, Jinan, Chonbuk. 26-IV-1994. S.S.Choi. 1 ex.: Mt. Jiri, Unbong, Chonbuk. 5-XI-1987. S.S.Choi. All specimens are deposited in the Lab. Pl. Protect., Coll. of Agr., Wonkwang Univ., Iksan, Korea.

Measurement. Body length : 1,192(1,344)1,440  $\mu\text{m}$ , width : 824(934)984  $\mu\text{m}$ .

Colour. Dark rust-brown.

Description. Prodorsum. Broadly triangular in outline and with foveolated surface. Rostrum rounded. Rostral setae thin, long, slightly flagellate at distal part,

weakly barbed, shorter than lamellar seta and originated on small apophyse at anterolateral margin of rostrum. Lamellae broad, equal in width throughout the length, anterior end cusped with short, sharp lateral tooth, small and round medial one. Lamellar surface dimpled with elongated pits. Translamella short and with a short and round mucro. Lamellar setae long, thin, slightly flagellated, weakly barbed and inserted at inner corner of lamellar cusps. Interlamellar setae long, thin, slightly flagellated, and inserted near to dorsosejugal suture and medial margin of lamellae. Sensillus short, clavate and slightly curved inwards.

Notogaster. Nearly rounded in outline except the anterior margin of dorsosejugal suture straight. Whole surface foveolated. Two pairs of shoulder setae short and simple ; anterior setae shorter than posterior ones. Neotrichies of notogaster long, thin, flagellate, weakly barbed and originated from the lateral or marginal part ; vary in number from 89 in holotype specimen to 138 in paratype one and asymmetrically arranged. Fissure

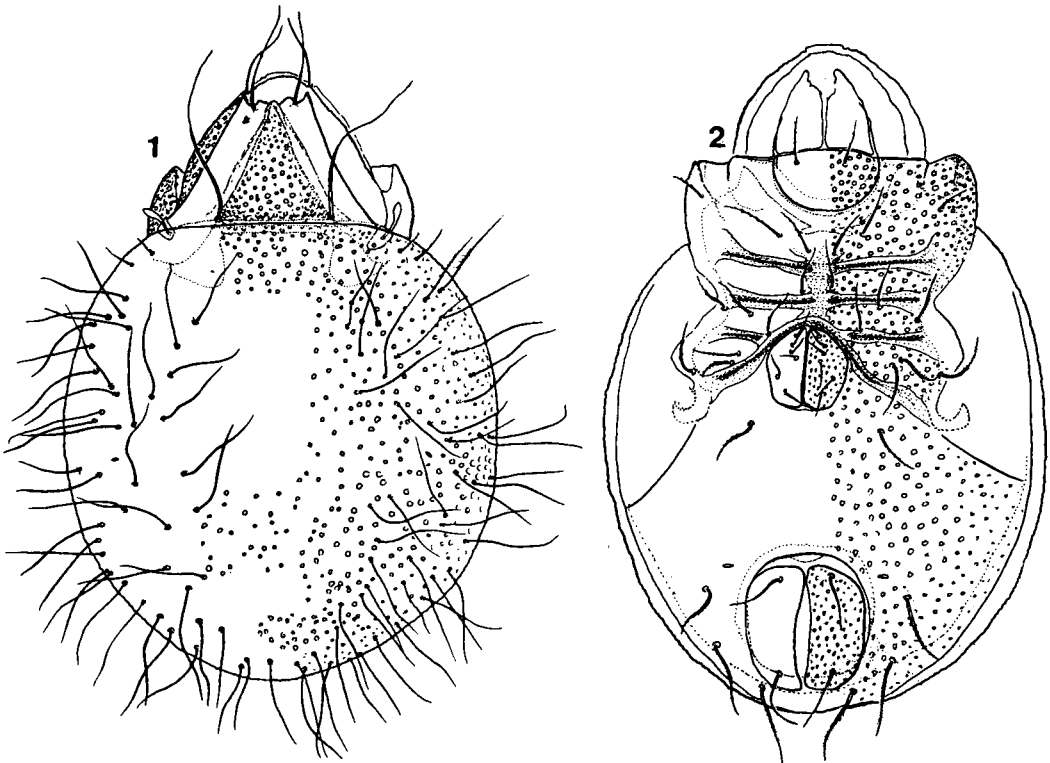


Fig. 2. *Xenillus multisetosus* sp. nov., 1:Dorsal side, 2:Ventral side.

*im* aligned transversely and located mediolateral side.

Ventral side. Whole surface with foveolated. Apodemata distinctly developed. Epimeral setal formula : 3-1-3-3 ; all setae rather long and weakly barbed. However, on the epimeron III of paratype specimen with 7 neotrichies on right side and 4 ones on left side. Six pairs of genital setae shorter and thinner than epimeral ones. Genital plates with small pits. A pair of aggenital setae similar to epimeral ones in length and shape. Neotrichies on aggenital plates of paratype specimen arranged asymmetrically : 5 on right side and 7 on left one. Two pairs of anal setae long, thin, and slightly flagellated at distal parts. Three pairs of adanal setae also long, weakly barbed and slightly flagellated ;  $ad_2$  and  $ad_3$  inserted adanal and  $ad_1$  postanal. Anal plates densely pitted on the surface. Fissure *iad* located anterolateral side of anal aperture. All legs tridactylous.

Remark. The most characteristic feature of the new species is the neotrichies on notogaster. Therefore, the new species is easily distinguishable from the other species of the genus *Xenillus*. This species was named by Paik in 1981 based on the specimen from Mt. Jiri without description. But the specimen has been lost unfortunately.

Family Nippobodidae Aoki, 1961

Genus *Nippobodes* Aoki, 1959

*Nippobodes tamlaensis* sp. nov.

탐라공검둥이응애

(Fig. 3)

Material examined. Holotype : Sangumburi, Kyorae-ri, Chocheon-eup, Cheju-do. 20-IV-1996. S.S.Choi. 3 paratypes ; the same data as the holotype. All specimens are deposited in the Lab. Pl. Protect., Coll. of Agr., Wonkwang Univ., Iksan, Korea.

Measurement. Body length : 656(680)688  $\mu\text{m}$ , width ; 448(464)480  $\mu\text{m}$ .

Colour. Black.

Description. Prodorsum. Rostrum broadly rounded with marginal plate and foveolated surface. Rostral, lamellar and interlamellar setae long, thick, slightly flagellate, blunt at tip and very weakly roughened. Ros-

tral setae originated from a small apophysis at dorsolateral of prodorsum. Lamellae well developed, located at marginal part of prodorsum and densely granulated. Anterior end of lamellae weakly protruding and lamellar setae inserted on it. Tutorium well developed. Sensillus thin, long, bent sickleform, weakly broadened in medial or distal portion and attenuating gradually to sharply pointed at tip. Prodorsal condyles well developed with roundly triangular.

Notogaster. Anteromedial portion of notogaster, i.e., interspace of notogastral condyles, well concave. Notogastral condyles huge, rectangular and ornamented with small tubercles. Ten pairs of notogastral setae present ; the setae *ta* on notogastral condyle sickleform with attenuating distally, weakly roughened and directed medially ; remaining 9 pairs rather long, straight, thick, blunt at tip and very weakly roughened at distal half.

Ventral side. Apodemata well developed ; Apo.3 short and obliquely. Surface of epimeres with round spots. Epimeral setal formula : 3-1-2(3?)-2. Lateral setae of epimeron IV remarkably long, thick, blunt at tip and directed backwards. Genital and anal plates rectangular. Anogenital chaetotaxy : 4-1-2-3. Genital setae  $g_2$  originates further from medial margin, and directed laterally. The length of anal seta longer than the width of anal plate. Fissure *iad* located anterolateral side or in front of seta  $ad_3$ . Adanal setae  $ad_1$  (ca. 70  $\mu\text{m}$ ) longer than their mutual distance and weakly roughened. All legs monodactylous.

Remark. The new species is closely related to *N. insolitus* Aoki, 1959 from Japan.

However, the latter species differs from the former in the shape of sensillus ("sichelförmig") and notogastral condyles. Tamla is an old name of Cheju-do.

*Nippobodes chejuensis* sp. nov.

제주공검둥이응애

(Fig. 4)

Material examined. Holotype : Sangumburi, Kyorae-ri, Chocheon-eup, Cheju-do. 20-IV-1996. S.S.Choi. 9 paratypes ; the same data as the holotype. All speci-

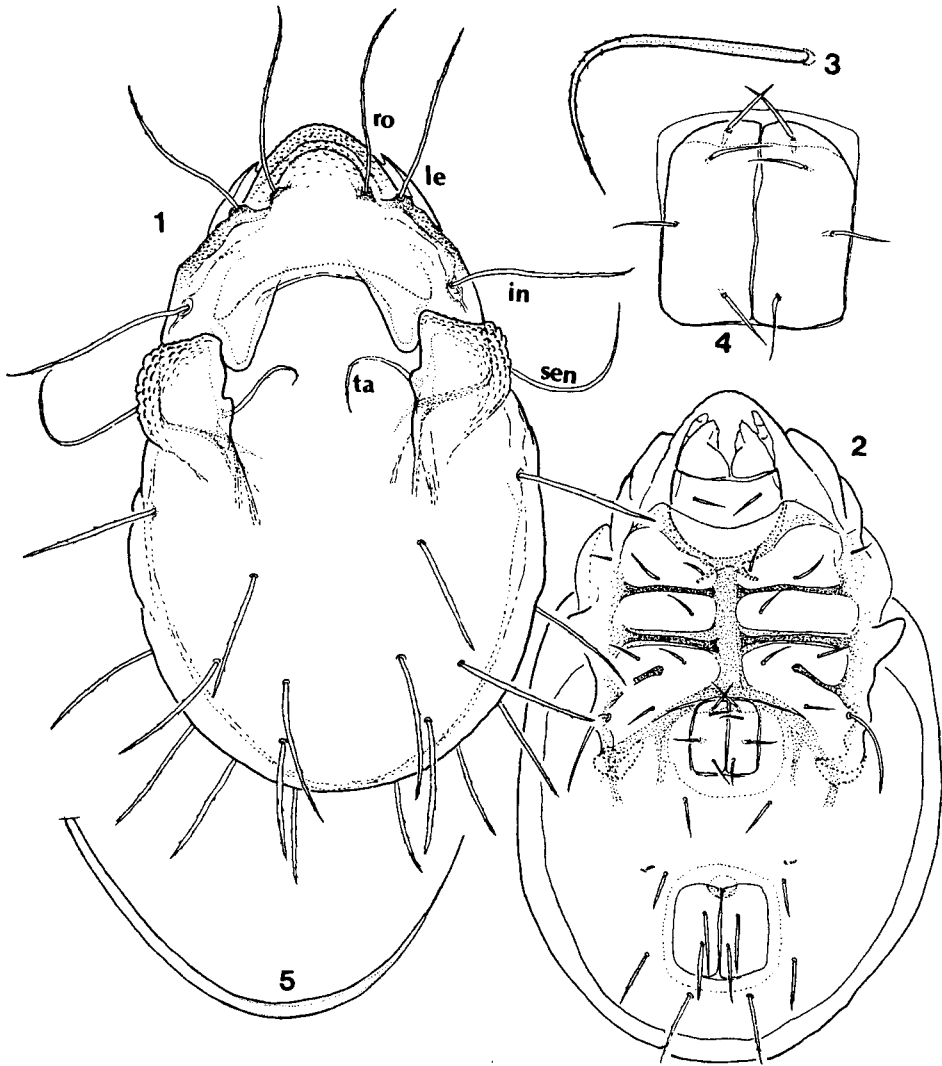


Fig. 3. *Nippobodes tamlaensis* sp. nov., 1:Dorsal side, 2:Ventral side, 3:Notogastral seta *ta*, 4:Genital plate, 5:Sensillus.

mens are deposited in the Lab. Pl. Protect., Coll. of Agr., Wonkwang Univ., Iksan, Korea.

Measurement. Body length : 748(787)824  $\mu\text{m}$ , width ; 496(534)568  $\mu\text{m}$ .

Colour. Black.

Description. Prodorsum. Rostrum rounded and with marginal plate and foveolated surface. Rostral, lamellar and interlamellar setae long, very weakly roughened, blunt at tip and slightly flagellated at distal part. Rostral setae originated on a small apophysis at dorsolateral prodorsum. Lamellae located on lateral margin of prodorsum. Anterior end of lamella roundly pro-

truded and lamellar seta inserted on it. Tutorium well developed. Sensillus long, thin, attenuating distally and well bent down or upwards at nearly middle part. A pair of prodorsal condyles large and rectangular or rounded at distal part.

Notogaster. Rounded in posterior margin. A pair of notogastral condyles large, rounded at distal margin with median lobe located at middle part, smooth on the surface. Anteromedial part of notogaster well concave. Eight pairs of notogastral setae present ; setae  $r_2$  and  $p_2$  absent ; the setae *ta* originated on median projection, long, thinner than other notogastral setae,

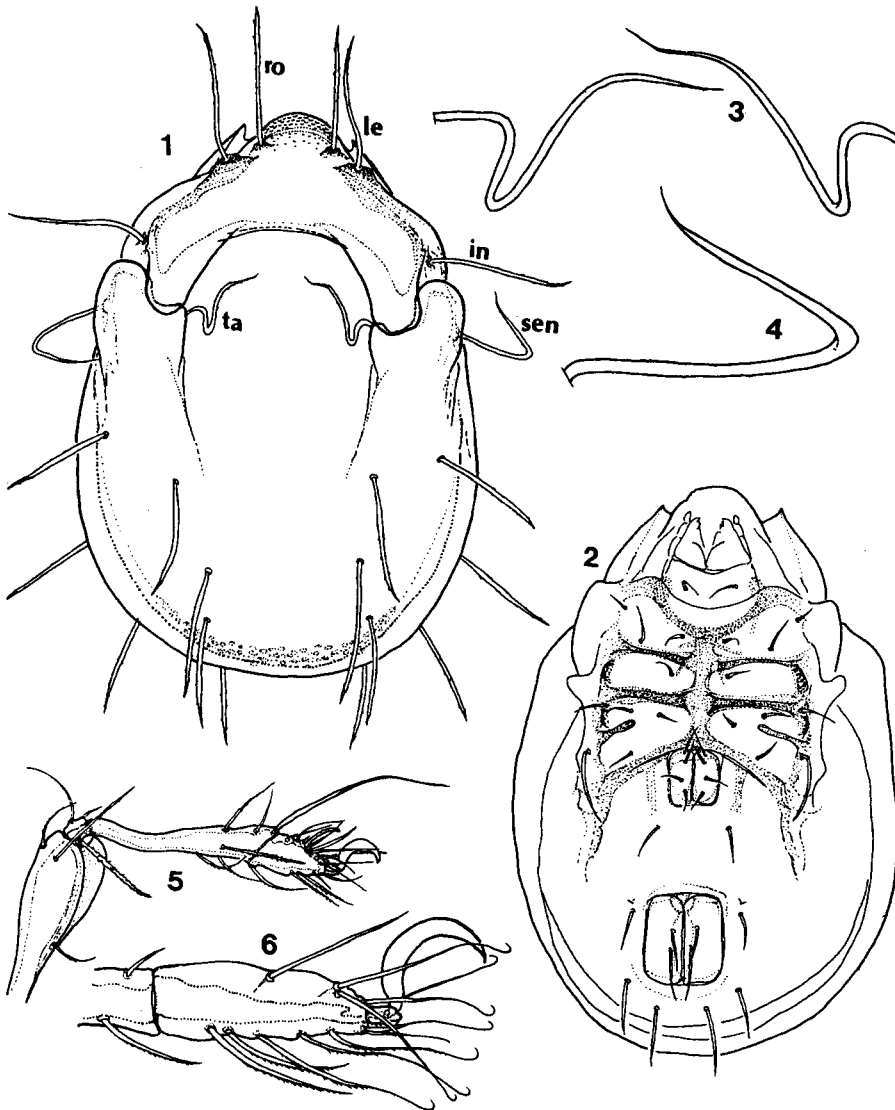


Fig. 4. *Nippobodes chejuensis* sp. nov., 1:Dorsal side, 2:Ventral side, 3:Notogastral seta *ta*, 4:Sensillus, 5:Tarsus of leg I, 6:Tarsus of leg IV.

well bent twice up and down, and directed medially ; remaining 7 setae long, thick, blunt at tip and very weakly roughened.

Ventral side. Epimeral surface with round spots. Apodemata well developed ; Apo.3 short and oblique. Epimeral chaetotaxy : 3-1-3-2 ; the lateral seta of epimeron IV remarkably long, thick, and directed backwards. Genital and anal plates rectangular. Anogenital setal formula : 4-1-2-3 ; genital setae  $g_2$  inserted nearly on the middle of genital plate. Fissure *iad* aligned

transversely and located in front of adanal setae  $ad_3$ . Adanal setae  $ad_1$  longer than their mutual distance and inserted postanal. All legs monodactylous.

Remark. The new species is similar to *N. brevisetiger* Aoki, 1981 from Japan. However, the latter differs from the former in 1) the short notogastral setae, 2) small body size (555-625  $\mu\text{m}$  in *N. brevitetiger*), and 3) triangular tip of notogastral condyle.

Since the genus *Nippobodes* was established by Aoki in 1959 using type species *N. insolitus*, five species have

been recorded. There are 7 species at present because the new two species from Korea are added in this paper. And there are 3 species in Korea as next key.

Key to the Korean species of the genus *Nippobodes*  
Aoki, 1959

1. - Notogastral setae *ta* absent. 704×472 μm.  
Japan, Korea . . . . . *N. latus* (Aoki, 1970)
- Notogastral setae *ta* present . . . . . 2
2. - Notogastral setae *ta* long and twice or three times well bent. Notogastral condyles round at tip and protruding medially. Eight pairs of notogastral setae. 787×534 μm. Korea . . . . . *N. chejuensis* sp.nov.
- Notogastral setae *ta* sickleform. Notogastral condyles huge, rectangular and ornamented with small tubercles. Ten pairs of notogastral setae. 680×464 μm. Korea . . . . . *N. tamlaensis* sp.nov.

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