

## A New Species of the Cave-dwelling Springtail *Lethemurus* (Collembola: Tomoceridae) from Korea

Gyu Dong Chang<sup>1</sup>, Young Gun Choi<sup>2</sup> and Yeon Jae Bae<sup>1,3,\*</sup>

<sup>1</sup>*Department of Life Science, Graduate School, Korea University, Seoul 02841, Korea*

<sup>2</sup>*Institute for Conservation of Wild Species, Daejeon 34093, Korea*

<sup>3</sup>*Division of Environmental Science and Ecological Engineering, Korea University, Seoul 02841, Korea*

**Abstract** - A new species of the cave-dwelling springtail *Lethemurus coreanus* Chang and Bae, sp. n. is described from Korea. *Lethemurus coreanus* can be distinguished from congeners by the spine-like setae on the tibiotarsus, numbers of dental spines, number of setae on the trochanteral organ, and body macrochaetae chaetotaxy. A key to the species of *Lethemurus* is provided.

**Key words** : *Lethemurus coreanus*, Tomoceridae, description, new species, troglobiont springtails, Korea

### INTRODUCTION

The springtail family Tomoceridae (Collembola) contains 166 species in 16 genera over the world (Janssens 2010). The rare tomocerid genus *Lethemurus* was described by Yosii (1970) based on the type species *Lethemurus finitimus* Yosii, 1970 from Japan. Yosii (1970) also recombined *Tomocerus* (*Tritomurus*) *missus* Mills, 1940 with *Lethemurus missus* (Mills) that had been described from the USA. Presently, two species in this genus are known in the world.

In this study, we describe a new species of *Lethemurus* from Korea. Comparison of diagnostic characters between congeneric species is provided with a key to the species.

### MATERIALS AND METHODS

Specimens were collected using aspirator and brush and preserved in 80-100% ethanol in 10-20 mL glass vials. Dis-

section, slide preparation, and observation were conducted using same methods as described in Chang *et al.* (2015).

Materials of the new species are deposited in the Korean Institute of Biospeleology (KIB) in Daejeon, Korea. The following materials of the congeneric species were also examined: *Lethemurus missus* (Mills): 1 female, Paulter Cave, Monroe CO, Illinois, USA, SJ Taylor & FN Soto-Adames, 14 ix 2009, Natural History Survey Collection, University of Illinois (Urbana-Champaign).

### TAXONOMIC ACCOUNTS

Genus *Lethemurus* Yosii, 1970

*Lethemurus* Yosii, 1970 (Type species: *Lethemurus finitimus* Yosii, 1970; Type locality: Nakatonbetsu Cave, Hokkaido, Japan.

**Diagnosis.** Eyes absent. Trochanteral organ well developed with ca 40 setae. Base of dentes without large lateral macrochaetae.

**Distribution.** Korea, Japan, USA.

\* Corresponding author: Yeon Jae Bae, Tel. 02-3290-3408,  
Fax. 02-3290-3623, E-mail. yjbae@korea.ac.kr

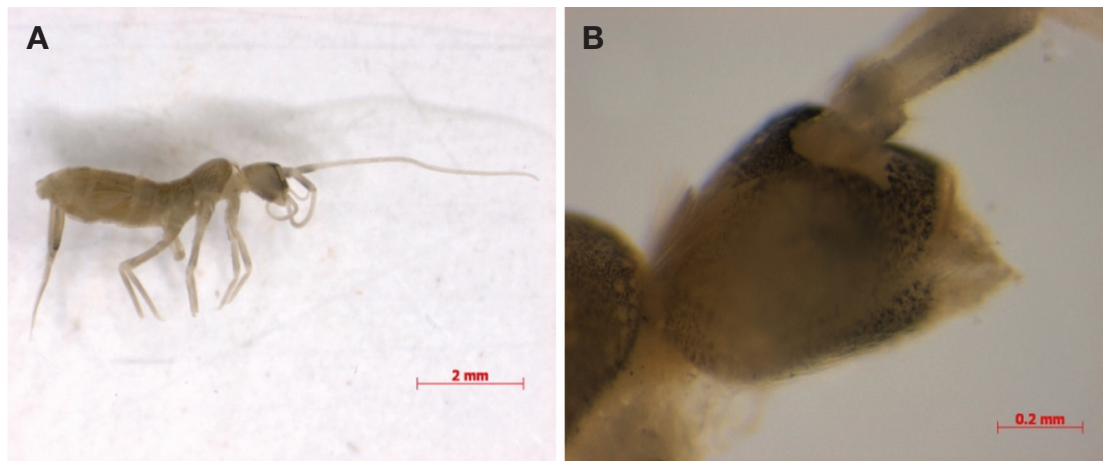


Fig. 1. *Lethemurus coreanus*: A. Whole body; B. Head part.

*Lethemurus coreanus* Chang and Bae, sp. n.

(Fig. 1-3)

(Korean name: Han-guk-gul-ga-si-tok-to-gi)

**Material examined.** Holotype: ♂, Gangwon-do, Samcheok-si, Singi-myeon, Daei-ri, Hwanseon-gul Cave (cave NO. 31), 8 i 1974, J Namsung, YG Choi [KIB]. Paratypes: 2♂ (same data as holotype).

**Description (Holotype).** Body light brown; some parts darker (Fig. 1A). Body size 5.0 mm; antennae longer than body size up to 4.8 mm, 4 times longer than head length (Fig. 2A). Body segment ratio 17 : 9 in thorax, 34 : 38 : 80 : 53 : 28 : 17 in abdomen. Antennae segment ratio 23 : 49 : 308 : 25. Third antennal organ not differentiated. Eyes and PAO absent (Fig. 1B). Head macrochaetae 2 + 2 / 5 + 5 / 2 + 2 (Fig. 2B). Labrum with smooth setae 6 / 5, 5, 4 and 4 spinules on distal margin (Fig. 3A). Chaetae of mesothoracic collar long. Distribution of body macrochaetae as in Fig. 2C. Leg segment ratio (coxa: trochanter: femur: tibiotarsus) 36 : 29 : 66 : 107. Trochanteral organ with 40 setae in trochanter, 35 setae in femur (Fig. 3B). Mid-legs with 1 femoral spine; hind-legs with 2 femoral spines (Fig. 3C). Unguis, unguiculus, and tenent hair ratio 14 : 9 : 8. Unguis with 1 small proximal inner tooth; unguiculus with 3 small teeth from proximal to middle part (Fig. 3D). Tenent hair tapering, acuminate (Fig. 3D). Ventral tube with numerous setae on posterior part (Fig. 3E, F). Retinaculum quadridentate with only 1 seta on corpus (Fig. 3G). Furca ratio 57 : 76 : 11. Dental spines simple form, 8-10 / 2, I, 1, I, 1, I, 1, I without lateral macrochaetae

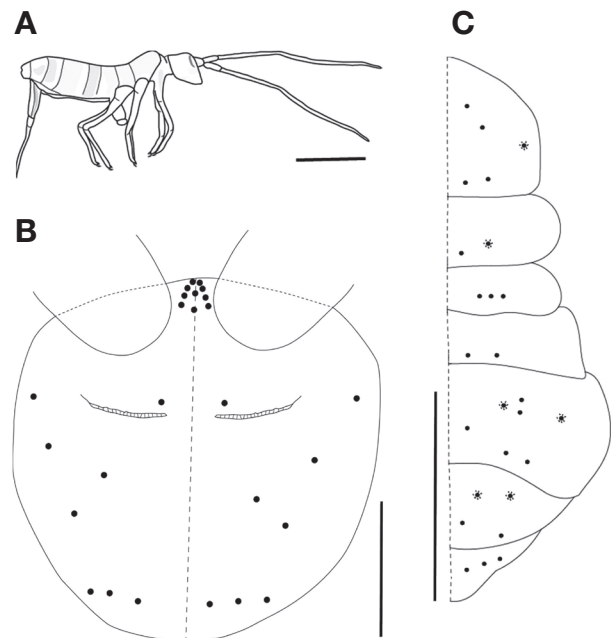
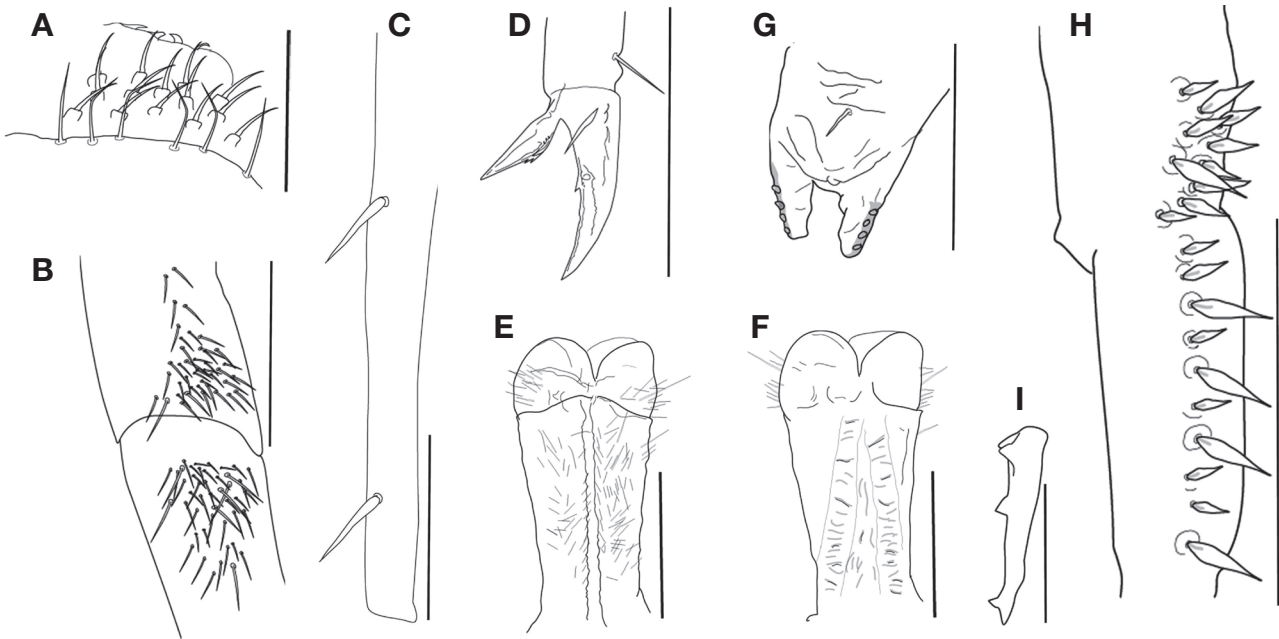


Fig. 2. *Lethemurus coreanus*: A. Whole body; B. Head chaetotaxy; C. Body chaetotaxy. Scale bars: 2 mm (A, C), 0.3 mm (B).

(Fig. 3H). Mucro long and slender, with 3 evenly spaced teeth; basal tooth with a clear membrane (Fig. 3I).

**Diagnosis (Table 1).** Antennae 4 times longer than head length, almost as long as body length (Fig. 2A). Eyes absent (Fig. 2B). Manubrium without macrochaetae in lateral side (Fig. 3A). Trochanteral organ present with ca 40 setae (Fig. 3B). Unguis with 1 tooth and unguiculus with 3 teeth (Fig. 3D). Dentes with several spines (Fig. 3H).

**Etymology.** The species epithet “*coreanus*” is from the



**Fig. 3.** *Lethemurus coreanus*: A. Labral setae; B. Trochanteral organ; C. Hind-leg tibiotarsus; D. Hind-leg claw; E & F. Ventral tube; G. Retinaculum; H. Dental spines; I. Mucro. Scale bars: 0.5 mm (A-F), 0.3 mm (G, H), 0.15 mm (I)

**Table 1.** Comparison of diagnostic characters between three species of *Lethemurus*

Species	<i>L. finitimus</i>	<i>L. missus</i>	<i>L. coreanus</i>
Distribution	Japan	USA	Korea
Habitat	Cave	Cave	Cave
Tenant hair	Spiny	Variable	Spiny
Unguis and Unguiculus teeth	1 & 2-3	1 & 3	1 & 3
Lateral macrochaetae on dentes	None	None	None
Dental spines	10 / 2, I, 1, I-II	5-8 / 3-5, I	8-10 / 2, I, 1, I, 1, I, I, I
Mucro teeth	2 / 1 / 2	2 / 1 / 2	2 / 1 / 2
Antenna length	3 Segments on one side and 2 on the other. Not seemingly very long	2 Times longer than head diagonal	More than 5 times longer than head diagonal
Trochantral organ	4 Spiny and some 7 minute setae in trochanter, irregular assembly of about 8, some of them are very long in femur	4 Setae in trochanter and 14 setae in femur. Setae size is irregular.	More than 40 setae in trochanter, also almost 40 setae in femur
Labral setae	8 / 5, 5, 4	6 / 5, 5, 4	6 / 5, 5, 4

country name Korea where the species is described.

**Remarks.** Type specimens of this species were collected from “Manmulsang” area in Hwanseon-gul Cave, located 200-250 m from entrance, a dark zone with constant temperature.

**Key to the species of *Lethemurus***

1. Trochanteral organ with ca. 40 setae in trochanter and

femur (Fig. 3B) ..... *Lethemurus coreanus*, sp. n.  
 Trochanteral organ with < 40 setae in trochanter and femur ..... 2  
 2. 8 / 5, 5, 4 labrum seta and 4 marginal spinules (Fig. 4A in Yosii 1970) ..... *Lethemurus finitimus*  
 6 / 5, 5, 4 labrum seta and 4 marginal spinules .....  
 ..... *Lethemurus missus*

**Remarks.** Key characters of *L. missus* were examined from the female specimen in Materials and Methods.

### ACKNOWLEDGEMENT

We sincerely thank Dr. Felipe Soto-Adames (Natural History Survey, University of Illinois at Urbana-Champaign) for his kind invitation and comments about *Lethemurus* systematics when GDC visited University of Illinois at Urbana-Champaign in 2013. This work was supported by a grant from the National Institute of Biological Resources (NIBR), funded by the Ministry of Environment (MOE) of the Republic of Korea.

### REFERENCES

- Chang GD, BH Lee, YG Choi and YJ Bae. 2015. Taxonomic review of the cave-dwelling springtail Tomoceridae (Collembola) in Korea. Entomol. Res. Bull. 31:65-76.
- Janssens F. 2010. Checklist of the Collembola. Available from URL: <http://www.collembola.org/> [cited date: 2013-VI-29]
- Mills HR. 1948. New North American Tomocerinae. Ann. Entomol. Soc. Am. 41:352-359.
- Yosii R. 1970. On some Collembola of Japan and adjacent country II. Contributions from the Biological Laboratory. Kyoto Univ. 23:1-32.

Received: 10 March 2016

Revised: 20 March 2016

Revision accepted: 20 March 2016