ASED http://e-ASED.org
Animal Systematics, Evolution and Diversity

Anim. Syst. Evol. Divers. Vol. 33, No. 2: 112-122, April 2017
https://doi.org/10.5635/ASED.2017.33.2.001

Short communication

# Notes on the Earwig Family Spongiphoridae (Insecta: Dermaptera), with a New Record of *Spongovostox sakaii* in Korea

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## ABSTRACT

The earwig species *Spongovostox sakaii* Nishikawa, 2006 is reported from the Korean Peninsula for the first time. The species was originally described from Amami-Oshima, Nansei Islands, Japan, which is located in the Oriental Region. Its distribution in Korea was confirmed by collections from Gwangneung Forest, which is located in the middle of South Korea. This is also first record of the pantropical genus *Spongovostox* Burr, 1911a from the Palearctic Region. Along with *Labia minor* Linnaeus, 1758 and *Paralabellula curvicauda* (Motschulsky, 1863), which had been reported from Korea previously, notes on the species are provided. And a key, descriptions, photos, and illustrations are given for their identification.

**Keywords:** Dermaptera, earwig, Korea, Spongiphoridae, *Spongovostox sakaii*, taxonomy

## INTRODUCTION

The family Spongiphoridae (formerly Labiidae) is a highly diverse group of mostly small- and medium-sized earwigs in which the eyes are usually shorter than the antennal scape and the second tarsomere is simple and cylindrical, without a ventral spine or lobe; most of the species are winged, and the male genitalia lobes lack a vesicle at the base of the virga; the forceps vary greatly among the genera and species and its shapes are often used in species identification (Brown, 1982). The members of this family are widespread in the tropics, with a preponderance of species and genera in the Indo-Australian and Neotropical Regions. Currently, 13 subfamilies with 42 genera and 506 species are known worldwide (Nishikawa, 1996, 2016).

Regardless of their diversity, though, few earwig species have been documented to occur in Korea. The first spongiphorid reported in Korea was *Labia curvicauda* (now *Paralabellula curvicauda*), which was collected in Mokpo (Jeollanam-do) by Kamijo (1934). This species is regarded as cosmopolitan, widely distributed around the world. It, however, is rarely mentioned in the literature among the dermapteran species of Korea. In fact, over the past 81 years, only the one was recognized in the Korean Peninsula (Ju, 1969; Kang, 1975; Moon, 1994; Kwon et al., 1996; Paek et al., 2010; Park and Lee, 2014). Then, Nishikawa and Han (2015) reported a second spongiphorid species, *L. minor*, from Pyeongyang, the capital of North Korea, based on two female specimens collected by the second author. This species is also recognized for its cosmopolitan distribution and similar to *P. curvicauda* in size.

In 2014, however, first author (T. Kim) was informed about the occurrence of unidentifiable earwigs by Mr. Ji-hwan Park, an elementary school teacher and nature photographer, who had photographed the insects in the National Arboretum, which is located in the Gwangneung Forest (Gyeonggi-do). Even from the photos, the earwigs could be easily distinguished from the two other species known to occur in Korea, owing to their colorful dorsal patterns. However, at that time, the identity of the insects was not investigated further. An earwig with similar characteristics was also pictured in 'Insects of Korea,' an atlas book published by the Korea National Arboretum (Park et al., 2012) and in which the earwig was identified into '*Anechura quelparta*,' which is considered a synonym of *Anechura japonica* since Sakai (1989).

In 2016, the first author discovered of the unknown ear-



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eISSN 2234-8190

wig, including (1) a female specimen pictured in the book 'Insects of Korea,' which was deposited in the insect collection of the Korea National Arboretum, and (2) one male and two nymph specimens, which were preserved in the Entomological Laboratory of Kyushu University (Japan) and subsequently donated to the National Institute of Biological Resources. Then in August of 2016, the first author discovered a living population of the species in Namyangju-si, which is within the boundary of the Gwangneung Forest. Finally, by carefully comparing the specimens to already known members of the genus *Spongovostox* Burr, 1911a, the second author (M. Nishikawa) identified the earwigs as *S. sakaii* Nishikawa, 2006, which belongs to the Spongiphoridae. Accordingly, a third spongiphorid has been added to the insect fauna of Korea, and this represents the second record of the species beyond its type locality, Amami-Oshima (Nansei Islands). The genus *Spongovostox* is mainly distributed in the Neotropical, Ethiopian, Indo-Australian, and Oriental Regions and comprises 60 species (Steinmann, 1990). This is the first record of the species from the Palearctic Region.

Based on the discovery of *Spongovostox sakaii* in Korea, the present paper provides notes on the three spongiphorids in Korea and includes a key, diagnoses, photos, and illustrations for their identifications. Voucher specimens have been deposited in the insect collections of the National Institute of Biological Resources (Incheon) and Ehime University Museum (Matsuyama). Classification system is followed by Engel and Haas (2007) and the 'Dermaptera Species File' (Hopkins et al., 2016).

## SYSTEMATIC ACCOUNTS

Family Spongiphoridae Verhoeff, 1902 (=Labiidae Burr, 1909)

### Key to Earwig species in Korea

1. Second tarsomere longer than broad (Subfamily Spongiphorinae); third tarsomere much longer than second (Genus *Spongovostox*); tegmina and wing scales with 4-spotted orange coloration (Fig. 1A, B); Male pygidium broader than long (Fig. 2A) ····· *Spongovostox sakaii*
– Second tarsomere broader than long or about as broad as long (Subfamily Labiinae) ····· 2
2. External parameres excised apically (Genus *Labia*); pronotum almost as long as broad (Fig. 1C, D); Male forceps long and thin, almost straight or slightly incurved, with sparse minute teeth on the inner margin; penultimate sternite with very distinct, elongated process that is visible from above (Fig. 2C). Female ultimate tergite almost smooth or weekly tumid above roots of forceps; forceps covered with fine pubescence only (Fig. 2D) ····· ····· *Labia minor*

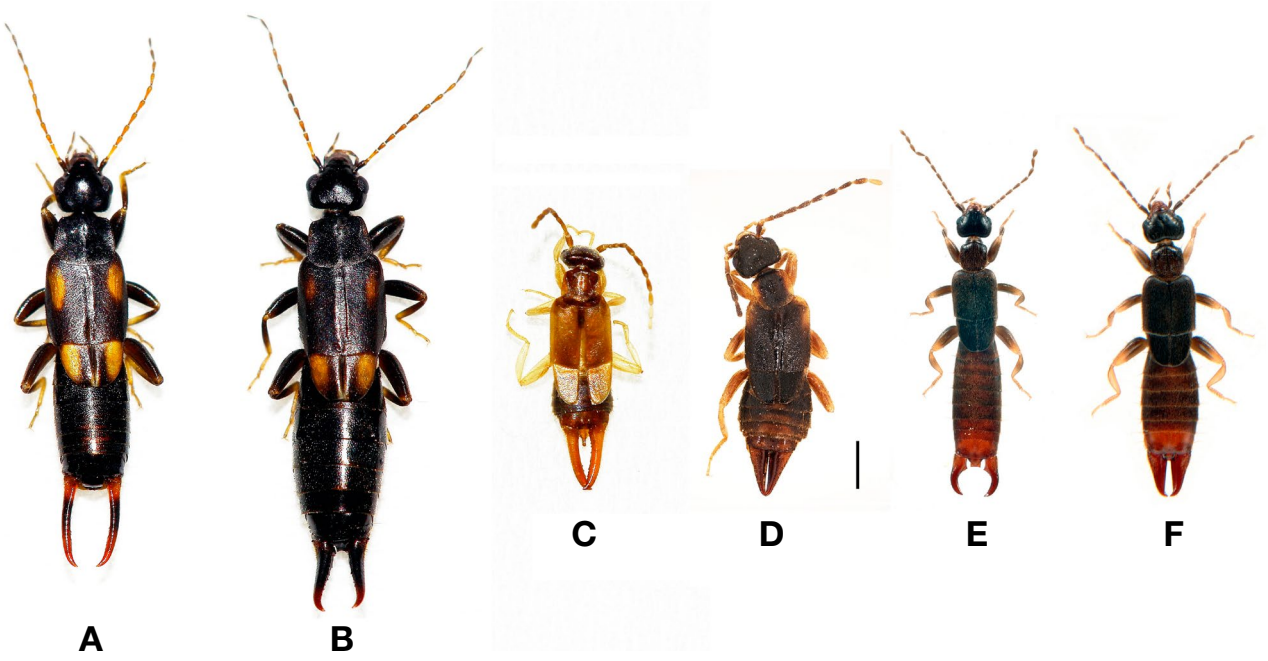


**Fig. 1.** Habitus of three Spongiphoridae species. A, B, *Spongovostox sakaii*, male (A) and female (B); C, D, *Labia minor*, male (C) and female (D); E, F, *Paralabellula curvicauda*, male (E) and female (F). Scale bar=1 mm.

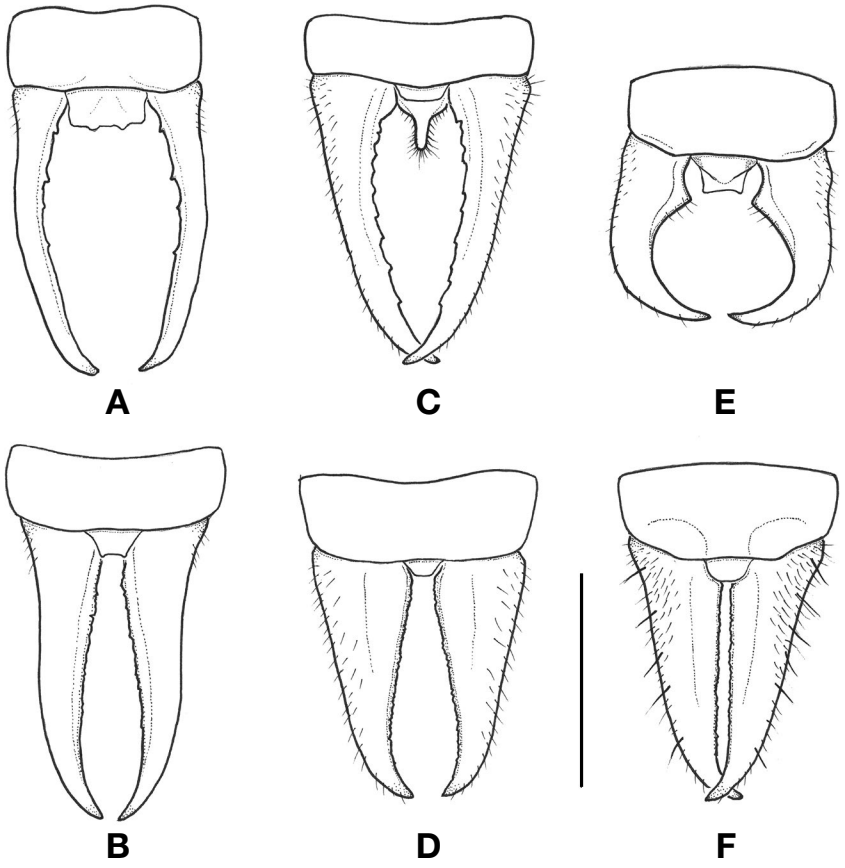


**Fig. 2.** Ultimate tergites and forceps of three Spongiphoridae species. A, B, *Spongovostox sakaii*, male (A) and female (B); C, D, *Labia minor*, male (C) and female (D); E, F, *Paralabellula curvicauda*, male (E) and female (F). Scale bar = 1 mm.

– External parameres simple, not excised apically, apex acuminate or blunt (Genus *Paralabellula*); pronotum longer than broad (Fig. 1E, F); Male forceps short and thick, strongly dilated near the base, strongly incurved in the apical part, sometimes forming practically a right angle; penultimate sternite simple (Fig. 2E). Female ultimate tergite tumid above roots of forceps; forceps covered with fine pubescence, with longer pubescence (Fig. 2F) ····· ····· *Paralabellula curvicauda*

Subfamily Spongiphorinae Verhoeff, 1902

Genus *Spongovostox* Burr, 1911a

Type species: *Forficula quadrimaculata* Stål, 1855

(= *Andex* Burr, 1911a: 60; type species: *Labia nigroflavida* Rehn, 1905)

(= *Microbostox* Hebard, 1917: 310; type species: *Spongovostox alter* Burr, 1912)

(= *Afrolabia* Hincks, 1949: 76; type species: *Afrolabia masai* Hincks, 1949)

### [1*]1. *Spongovostox sakaii* Nishikawa, 2006 (Figs. 1A, B, 2A, B, 3, 4A, B, 5)

*Spongovostox sakaii* Nishikawa, 2006: 31 (type locality: Japan, Amami-Oshima Island; holotype male and paratypes male and female, Tokyo University of Agriculture and Osaka Museum of Natural History); Nishikawa, 2016: 181.

*Anechura quelparta*: Park et al., 2012: 57 (misidentification).

**Material examined (12 specimens from Korea).** 2 nymphs, Kwan Nung (= Gwangneung), Pocheon Gun, 8 Sep 1984, Morimoto K; 1 male: ibid. 16–19 Jul 1992, Chujo MT; 1 female: ibid. (= Gwangneung, Gyeonggi-do), 23 Jun 1997, Weon G (det. as *Anechura quelparta* by Weon G in 2004, No. KNAE51932); 4 males and 4 females: Gyeonggi-do, Namyangju-si, Jinjeop-eup, Bongseonsa Temple, 5 Aug 2016, Kim T.

**Description.** Body coloration dark brown with two pairs of large yellowish spots on tegmina and wing scales. Eyes

[1*]Korean name: 멋쟁이꼬마집게벌레, Japanese name: サカイヨツボシハサミムシ, English name: Four-spotted bark earwig

small, as long as post-ocular length. Antennae with 13 segments, scape longer than third antennomere, second antennomere shortest. Pronotum as long as wide. Legs yellowish brown, basally dark.

**Male (Figs. 1A, 2A):** Forceps slender, separate basally, dilated near the base, gently narrowed to near middle, dilated for distal 1/3, and narrowed again towards apex; outer margin gently rounded or sometimes very slightly incurved in S-shape, inner ventral margin with 3 to 4 short teeth, sometimes these teeth obsolete. Penultimate sternite emarginated posteriorly. Pygidum wide, feebly dilated posteriorly, terminating in 2 lateral denticles, each of which is sometimes bifid, usually with a concave or nearly truncate caudal margin.

**Genitalia (Fig. 3):** Parameres elongate, widest at base, subacuminate apically; virga long, slightly expanded towards base; penis lobe with peculiar sclerotized accessory armatures.

**Female (Figs. 1B, 2B):** Forceps simple, contiguous, nearly straight, trigonal; dorsal and ventral inner margins irregularly serrate. Penultimate sternite nearly rounded posteriorly or more or less truncate mesad. Pygidium usually not visible in dorsal aspect.

**Measurements:** Length of body, not including forceps, 6.0–8.0 mm in males, 5.8–8.6 mm in females; tegmina 2.0–2.2 mm; forceps 1.5–2.0 mm in males, 1.4–2.0 mm in females.

**Distribution.** Korea (Gwangneung; new record) and Japan (Amami-Oshima; type locality).

**Remarks.** The present study confirms the occurrence of this earwig species at the locality Gwangneung Forest, which is in the middle province (Gyeonggi-do) of South Korea. The species can be found under the bark of dead trees or on mushrooms, usually in the same habitat as *Leptaulax koreanus* (Passalidae). Its voltinism, or life cycle, is uncertain.

**Fig. 3.** Male genitalia of *Spongovostox sakaii* collected in Korea. Scale bar = 0.2 mm.

Subfamily Labiinae Burr, 1909

Genus *Labia* Leach, 1815

Type species: *Forficula minor* Linnaeus, 1758

(= *Copiscelis* Fieber, 1853: 257; type species: *Forficula minor* Linnaeus, 1758)

### [1*]2. *Labia minor* Linnaeus, 1758 (Figs. 1C, D, 2C, D, 4C, D)

*Forficula minor* Linnaeus, 1758: 423 (type locality: Europe, holotype female, Linnean Collection); Genè, 1832: 224.

*Labia minor*: Leach, 1815: 118; Scudder, 1876: 320; Kirby, 1904: 25; Burr, 1911b: 55; Blatchley, 1920: 51; Hebard, 1934a: 25; Hebard, 1934b: 151; Bey-Bienko, 1936: 110; Bazyluk, 1956: 10; Bey-Bienko, 1964: 289; Sakai, 1970: 113; Hudson, 1973: 250; Langston and Powell, 1975: 13; Nishikawa, 1975: 65; Harz and Kaltenbach, 1976: 52; Srivastava, 1976: 33; Vickery and Kevan, 1985: 47; Tadauchi, 1989: 59; Marshall and Haes, 1990: 135; Steinmann, 1990: 468; Srivastava, 1995: 103; Sakai, 1997: 49; Fontana et al., 2002: 524; Kocarek et al., 2005: 268; Haas, 2008: 40; Srivastava, 2013: 70; Beron, 2015: 212; Nishikawa and Han, 2015: 2; Nishikawa, 2015: 20; Nishikawa, 2016: 180.

*Copiscelis minor*: Fieber, 1853: 257.

*Forficesila minor*: Frivaldsky, 1867: 46.

Synonyms:

*Forficula livida* Zschach, 1788: 46 (Europa).

*Forficula media* Marsham, 1802: 530 (Capta prope Dartford).

*Labia minuta* Scudder, 1862: 415 (North America, Massa-

[1*]Korean name: 참꼬마집게벌레, Japanese name: ミジンハサミムシ, English name: Little earwig, least earwig, lesser earwig, small earwig

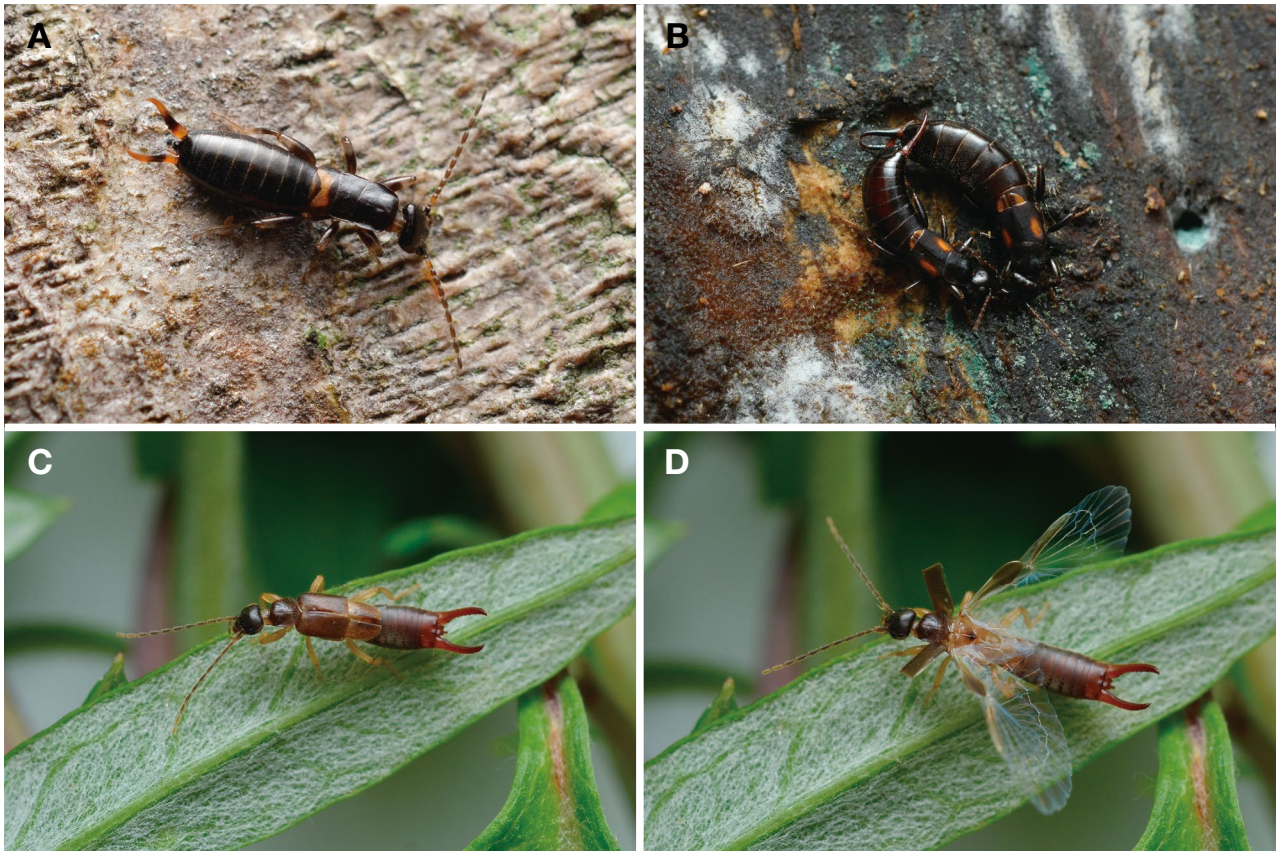


**Fig. 4.** Photos of Spongiphoridae in the field (©Park Ji-Hwan). A, B, *Spongovostox sakaii*, nymph, 2 Aug 2014, Gwangneung, Gyeonggi-do (A) and mating, 9 Jul 2016, ibid (B); C, D, *Labia minor*, male ready to fly, 11 Jul 2015, Heongseong, Gangwon-do.

chusetts, Virginia; syntypes male and female).

*Labia bhaktapurensis* Kapoor, Malla and Shah, 1978: 60 (Nepal, Bhaktapur; holotype male).

*Labia harypa* Steinmann, 1990: 467 (Vietnam, Cuc Phuong; holotype male).

*Labia pluto* Steinmann, 1990: 469 (Philippines, Manila; holotype male).

**Material examined (5 specimens from Korea).** Korea: 1 male: Gyeonggi-do: Suwon-si, Gwonseon-gu, Seodun-dong, 16 Sep 2008, Han T; 1 male: Gyeongsangbuk-do: Cheongsong-gun, Andeok-myeon, Gameun-ri, Mount Sanjibong, 11 Aug 2016, light trap, Park S; 1 male: Uiseong-gun, Danchon-myeon, Mount Cheonjebong, 6 Aug 2016, light trap, Park S; 2 females: Pyong Yang City, Sun An Airport (light at entrance), 17 Jul 2008, Han C.

**Description.** Body coloration yellowish to dark brown, entire body thickly covered with fine yellowish pubescence. Head and sides of abdomen nearly black; mouthparts, antennae, thorax, tegmina, exposed parts of wings, and middle of upper side of abdomen yellowish to dark brown. Eye shorter than side of head behind eye. Antennae with 12 segments, fourth antennomere as long as third ones, a few apical antennomeres paler. Pronotum subquadrate, narrower than head, about as long as broad. Tegmina nearly twice as long as pronotum, hind wings twice as long as pronotum, when folded, and extending beyond tegmina. Legs honey-yellow to yellowish brown. Abdominal tip and forceps, reddish-brown.

**Male (Figs. 1C, 2C):** Forceps slender and long, separated basally, almost straight or slightly incurved, with 7–8 denticles on the inner margin. Penultimate sternite with very distinct, elongated process, which is easily visible from above.

**Female (Figs. 1D, 2D):** Ultimate tergite almost smooth or weekly tumid above roots of forceps. Forceps covered with fine pubescence, serrulated with micro denticles on inner margins; inner margins subparallel, touching along their entire length when resting.

**Measurements:** Length of body, not including forceps, 5.5–8.5 mm; tegmina 1.3–1.7 mm; forceps 1.5–2.5 mm in males, 1.0–1.5 mm in females.

**Distribution.** Cosmopolitan: Korea, Japan, China, India,


**Fig. 5.** *Spongovostox sakaii* collection localities and zoogeographical distinctions by Watase's line around the Nansei Islands. ①, Amami-Oshima; ②, Gwangneung Forest.

Sri Lanka, Myanmar, Nepal, Vietnam, Philippines, New Zealand, Australia, Lebanon, Rhode Islands, Europe, Russia, USA, Canada, Galapagos Islands, Argentina, Madeira, Azores, Africa, Madagascar, Mauritius, and Seychelles.

**Remarks.** Similar to *Forficula auricularia*, this earwig is a common dermapteran of Europe. Although the species is recognized to possess a cosmopolitan distribution, female specimens were reported from North Korea only recently (Nishikawa and Han, 2015), and regarding the natural photographs taken in Gangwon-do (Fig. 4C, D), the present study provides the first report of male specimens in South Korea. It is likely that the species occurs widely throughout the Korean Peninsula but has been overlooked or misidentified as *P. curvicauda*, on account of its small size. This species is synanthrope, coprobiont, preferring pastures, secondarily also compost and dung heaps (Kocarek et al., 2005). It is mainly nocturnal, flies well, and is often attracted to lights at night (Vickery and Kevan, 1985). In hot weather, the adults may fly considerable distances from their normal habitat and are sometimes found in buildings or vehicles (Marshall and Haes, 1990).

Genus *Paralabellula* Kevan, 1997

Type species: *Paralabellula brindlei* Kevan, 1997 (=*Metalabella* Sakai and Takahashi, 1998: 54; type species: *Forficesila curvicuda* Motschulsky, 1863)

### [1]*3. *Paralabellula curvicauda* (Motschulsky, 1863) (Figs. 1E, F, 2E, F)

*Forfiscelia* [sic: *Forficesila*] *curvicauda* Motschulsky, 1863: 2 (type locality: Ceylon (=Sri Lanka), Des Montagnes de Nura-Ellia, syntypes lost).

*Labia curvicauda*: Dohrn, 1864: 428; Scudder, 1876: 319; Kirby, 1904: 26; Burr, 1911b: 56; Blatchley, 1920: 52; Hebard, 1922: 318; Shiraki, 1928: 11; Kamijo, 1934: 178; Bey-Bienko, 1936: 110; Yasumatsu et al., 1965: 50; Cho, 1969: 809; Ju, 1969: 27; Sakai, 1970: 127; Brindle, 1972: 154; Hudson, 1973: 249; Nishikawa, 1975: 65; Kang, 1975: 11; Srivastava, 1976: 32; Kim and Nam, 1982: 122; Nam and Kim, 1983: 126; Tadauchi, 1989: 59; Moon and Kim, 1991: 72; Shin et al., 1993: 8, 139; Moon, 1994: 47; Paik, 1995: 291; Kwon et al., 1996: 103; Ahn et al., 2013: 16.

*Labia cauvicauda* [sic: *curvicauda*]: Kim and Moon, 1985: 47.

*Paralabella curvicauda*: Steinmann, 1990: 497; Sakai, 1997: 49; Chen and Ma, 2004: 189; Haas, 2008: 40; Park and Lee, 2014: 17; Beron, 2015: 212.

*Circolabia curvicauda*: Srivastava, 1995: 102; Srivastava, 2013: 93.

*Paralabellula curvicauda*: Kevan and Vickery, 1997: 318; Paek et al., 2010: 33; Paek, 2012: 35; Nishikawa, 2016: 180.

*Metalabella curvicauda*: Sakai and Takahashi, 1998: 54.

*Circolaabia* [sic: *Circolabia*] *curvicauda*: Srivastava, 2003: 173.

[1]*Korean name: 꼬마집게벌레, Japanese name: チビハサミムシ, English name: Curved-tailed earwig

Synonyms:

*Forfiscelia* [sic: *Forficesila*] *dilaticauda* Motschulsky, 1863: 3 (type locality: Ceylon (= Sri Lanka), Des Montagnes de Nura-Ellia).

*Platylabia dimidiata* Dohrn, 1867: 348 (type locality: Philippines, parte boreali insulae Luzon; holotype male).

*Platylabia guineensis* Dohrn, 1867: 348 (type locality: São Tomé and Príncipe, insula Principis in ligno putrido).

*Labia flavicollis* de Bormans in Burr, 1903: 235 (type locality: Samoa, holotype male).

*Platylabia camerunensis* Borg, 1904: 570 (type locality: Cameroon, holotype male).

*Platylabia dimidiata* var. *guineensis* and *camerunensis*: Borelli, 1907: 382.

*Labia rechingeri* Holdhaus, 1909: 541 (type locality: Samoa, Upolu).

*Mimolabia boninensis* Matsumura, 1914: 118 (type locality: Japan, Bonin Islands; "Chibihasamimushi", Japanese name, but no description, *Nomen nudum*).

*Platylabia legoci* Fernando, 1957: 221 (type locality: Ceylon (= Sri Lanka), Colombo).

*Labia phanduwalensis* Kapoor et al., 1971: 30 (type locality: India, Uttarakhand, Dehra Dun, Phanduwala).

*Proreus chatterjeei* Kapoor et al., 1971: 33 (type locality: India, Uttarakhand, Dehra Dun, Kaunli garden).

**Material examined.** No materials were used in the present study; however, a number of specimens have been described in previous reports (Kim and Nam, 1982: 2 ex., Mt. Gyebangsan, 21 Jul 1981; 1 ex., Mt. Gachilbong, 23 Jul 1981; Nam and Kim, 1983: Mt. Jirisan, 20 Jun 1982, 19 Aug 1982; Kim and Moon, 1985: 1 male and 1 female, Gyeonggi-do: Ganghwa, Mazo-ri, Kumsung Elementary School, 17 Aug 1985, light trap, Moon TY, Kwon OS; Shin et al., 1993: 1 male, 27 Sep 1992, Moon TY). According to personal communication from Prof. Tae-Young Moon (Kosin University, Busan), all of the earwig specimens described by these previous reports were kept in the alcohol vials in the Entomological Laboratory of Korea University (Seoul). However, the Department of Biology transferred to a new building in 2006, and these collections are now difficult to access.

**Reference materials examined (4 specimens from Japan).** 2 males and 1 female: Kinoko-no-mori, Nakano-gô, 33°04′10″N, 139°48′40″E, Hachijo-jima Island, 1 Jun 2010, Takasu H; 1 female: Nago, Okinawa-jima Island, 24 Oct 2010, Moriguchi M.

**Description.** Body somewhat depressed and finely pubescent, dark brown or chestnut, head often blackish. Eyes small, half as long as the side of head behind eye. Antennae brown, a few apical antenomeres paler. Pronotum longer than wide, hind margin rounded. Tegmina and wings dark. Legs brownish-yellow, femora often blackish at base. Abdomen slightly dilated, the last segment paler, impressed at middle, narrow, with a small tubercle each side above the insertion of forceps.

**Male (Figs. 1E, 2E):** Forceps short and thick, strongly dilated near the base, then strongly incurved and attenuated in the apical part, meeting or overlapping at tips, sometimes forming practically a right angle when resting. Penultimate sternite simple.

**Female (Figs. 1F, 2F):** Ultimate tergite tumid above roots of forceps. Forceps covered with fine pubescence, with longer pubescence, nearly straight, contiguous, unarmed.

**Measurements:** Length of body, not including forceps, 5.6–6.8 mm in males, 5.7–7.9 mm in females; tegmina 1.5 mm; forceps 0.5–1.1 mm in males, 0.9–1.5 mm in females.

**Distribution.** Nearly cosmopolitan: Korea, Japan, China, Hong Kong, Taiwan, Myanmar, Thailand, Philippines, Indonesia (Kalimantan, Java, Sumatra, and Sulawesi), Malaysia, India, Andaman Islands, Nicobar Islands, Sri Lanka, New Zealand, Hawaii, Micronesia, Tahiti, Samoa, Solomon Islands, Madeira, Principe Island, Africa (Uganda, Gabon, Equatorial Guinea, Cameroon, and Nigeria), Comoros, Madagascar, Mauritius, Seychelles, USA (Florida), Panama, Cuba, Dominica, Jamaica, Suriname, Nicaragua, and Brazil.

**Remarks.** This earwig occurs in a variety of natural habitats, most commonly under the bark of logs and tree trunks (Srivastava, 2013), but as an adventive species only occurs around human habitation (Hudson, 1973). Compared to the active flier *L. minor*, *P. curvicauda* is not strongly attracted to lights at night, as far as we know, even though both earwigs possess flight ability. If we referred, previous Japanese or Korean records of the species possibly to suspect contain errors in there. For examples, Yasumatsu et al. (1965) published a photo of a female '*L. curvicauda*' specimen (from Ehime, Matsuyama) and Paek (2012) published a photo of *P. curvicauda* attracted to light (from Gapsa Temple, Chungcheongnam-do, 24 Jul 2004); however, both are probably misidentifications of male *L. minor* with peculiar terminalia. In comparison with the cosmopolitan distribution of *L. minor*, *P. curvicauda* seems to possess a more tropical distribution (circumtropical). Indeed, *P. curvicauda* has only been confirmed southward from the Ogasawara Islands, Izu Islands, Nansei Islands, and Honshu in Japan and, although the species was previously believed to possess a wide distribution in Japan (Tadauchi, 1989), it has not yet been reported northward from Shikoku, Kyushu, or Hokkaido (Nishikawa, 2016). Therefore, the occurrence of the species from questionable localities should be confirmed, and the identity of voucher specimens from these localities should be reexamined.

## DISCUSSION

Only three spongiphorid species (*S. sakaii*, *L. minor*, and *P. curvicauda*) have been reported from Korea, whereas 17 and 5 species have been reported from China (Sakai et al., 1994) and Japan (Nishikawa, 2016), respectively, all three of the species reported from Korea also occur in Japan. In addition, both *L. minor* and *P. curvicauda*, which belong to subfamily Labiinae and are widely distributed cosmopolitan species, have been reported from China; however, there is still some confusion among the species, especially in regards to the morphological illustrations of their forceps (Chen and Ma, 2004: 189, fig. 93, a = *L. minor*; b = *P. curvicauda*). The remaining species, *S. sakaii*, which belongs to subfamily Spongiphorinae, was previously only known from its type locality (Amami-Oshima Island) in Japan but is now expected to be distributed over a much broader range that includes the Korean Peninsula.

It is interesting to infer how the two *S. sakaii* populations were dispersed throughout geological history, especially since the type locality of the species is a relatively isolated island that is distant from the Korean Peninsula. It may be useful to consider the distribution of '*Gonolabis distincta*' (now *Mongolabis distincta*), which was also reported from the Gwangneung Forest (Moon, 1993), and even though the species was originally described from the Ryukyu Islands (Nishikawa, 1969), further distribution was recently reported from Kagoshima, which is in Southern Kyushu (Nishikawa, 2008). In addition, the distributions of both earwig species are thought to possess northern limit components across the Oriental and Palearctic Regions. Two regions bordered by the 'Watase's line' put on Tokara Strait between Akuseiki-jima Island and Kodakara-jima Island of the Tokara Islands since Kuroda (1925) in Japan (Fig. 5). However, there has been no detailed zoogeographical consideration along extending to Korean Peninsula, and even now, quite numbers of Oriental species have been found in South Korea.

Notably, the Gwangneung Forest (24,465 ha) is famous as the last refuge of the now-extinct white-bellied woodpecker (*Dryocopus javensis richardsi*) in East Asia, where located across Pocheon-si, Namyangju-si and Uijeongbu-si (Gyeonggi-do) in South Korea. The Gwangneung forest is a lowland royal forest (Choseon Dynasty) that has been well preserved for more than 500 years, since 1468, and owing to its conservation value, the forest has been designated as a Biosphere Reserve by UNESCO since 2010 (UNESCO, 2016). Of the 22 endangered insect species in Korea, seven are known to occur in this special forest, including *Callipogon relictus*, *Lethocerus deyrolli*, *Gymnopleurus mopsus*, *Cigaritis takanonis*, *Argynnis nerippe*, *Parnassius bremeri*, and *Bibasis striata*, as well as the peculiar endemic beetle *Leptaulax koreanus* (Passalidae). It is notable that 3,925 insect species have been recorded in this forest, which is far greater than the number of species that have been reported from two representative Korean National Parks (1,301 species in Mount Seloraksan, and 1,572 species Mount Hallasan) (Byeon et al., 2006). The dermapteran fauna of Gwangneung Forest includes six species from two families: *Anisolabella marginalis* and *Mongolabis distinta* in the Anisolabididae; and *Anechura japonica*, *Anechura quelparta*, *Forficula scudderii*, and *Timomenus komarowi* in the Forficulidae. However, *A. quelparta* was a misidentification of *S. sakaii* (Spongiphoridae), as reported here.

Because of the secretive lifestyles of small-sized spongiphorids, the detailed distributions of these species in East Asia, as well as their ecologies, are insufficiently known. In the present study, only a few specimens were examined. Therefore, additional studies are needed to improve our understanding of this group in Korea, Japan, or adjacent countries.

## ACKNOWLEDGMENTS

The authors are grateful to Mr. Ji-hwan Park for providing important information and original photos of *S. sakaii* and *L. minor* in the field, Dr. Jongok Lim (Korea National Arboretum) for generously loaning the earwig specimen deposited in the collection of the Korea National Arboretum, Dr. Taeman Han (National Academy of Agricultural Sciences) and Dr. Sangwook Park (Research Institute of Forest Insects Diversity) for generously providing male specimens of *L. minor*, Dr. Hiroyuki Yoshitomi (Ehime University Museum) and Mr. Juriya Okayasu (Entomological Laboratory of Faculty of Agriculture, Ehime University) for providing an original photo of *L. minor* from North Korea (Fig. 1D), and Mr. Fukuo Ito and Mr. Takashi Murai (Orthopterological Society of Japan) for providing an original photo of *P. curvicauda* from Japan (Fig. 1E, F). 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 (NIBR201601120).

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Received January 13, 2017
Revised April 10, 2017
Accepted April 10, 2017