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First record of the genus *Phauloppia Berlese*, 1908 (Acari: Oribatida: Oribatulidae) with description of *Phauloppia lucorum* (C.L. Koch, 1841) from Korea

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From the soil biodiversity study, we found a species, *Phauloppia lucorum* (C.L. Koch, 1841) in the family of Oribatulidae (Acari: Oribatida) from the straw mat covering the cherry trees during winter in 2011. This species inhabiting litter and soil of forest, moss and lichens on tree and stones is distributed in the eastern Asia and western and central parts of Europe. In this paper, we illustrate the diagnostic features of a new species with detailed diagrammatic representations and its geographical distribution.

Keywords: cherry tree, Korea, Oribatida, Oribaulidae, *Phauloppia lucorum*, taxonomy

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Introduction

The family Oribatulidae Thor, 1929 comprising 18 genera and more than 200 species is distributed worldwide (Subías, 2004, Online version 2012). They are common, and sometimes abundant in terrestrial ecosystems, especially in forest (Seniczak and Seniczak, 2012). The diagnostic characteristics of this family are considered to be the following: adult relatively medium or small in size, covers moderately sclerotized; lamellae of different shapes, translamella absent or present; notogaster with 13-14 pairs of setae, four pairs of true pore fields; pteromorph not developed; tridactylous legs (Bayartogtokh, 2010). The genus *Phauloppia* Berlese, 1908 under the family Oribatulidae Thor, 1929 is established with the type species *Zetes lucorum* C.L. Koch, 1841 (= *Oppia conformis* Berlese, 1895) and about 25 species are assigned to this genus (Subías, 2004, Online version 2012). *P. lucorum* was the most abundant in lichens covering the tree trunks (André, 1984; 1985). They are known to phoretic on the fir bark beetle *Pityokteines curvidens* (Coleoptera: Curculionidae) (Pernek *et al*., 2012).

In Korea, Oribatulidae is represented by four genera, namely *Dometorina* Grandjean, 1951, *Oribatula* Berlese, 1896, *Lucoppia* Berlese, 1908 (= *Romanobates* Feider Vasiliu and Calugar, 1970) and *Zygoribatula* Berlese, 1916 (Kim and Jung, 2012; NIBR, 2013). The genus *Dometorina* has been described under the family Hemileiidae by Subías (2004, Online version 2012).

We found new genus and species to Korean inventory compared to the existed checklist of oribatid mite from NIBR (2013) or other list (Kim and Jung, 2012). In this work, we present a taxonomic diagnosis of the genus and species, and morphological characteristics with detailed illustration.

Materials and Methods

The specimen was collected from the straw mat covering the cherry trees in Andong National University, Andong, Gyeongsangbuk-do in January, 2012. Oribatid mites were extracted by using a modified-Tullgren funnel for 72 hrs with 30-watt bulb (Kim and Jung, 2008; Jung *et al*., 2010; Kim *et al*., 2010; Kim *et al*., 2011). The extracted mites were mounted on the slides using polyvinyl alcohol (PVA) mounting medium (Downs, 1943; BioQuip, Rancho Dominiquez, CA, USA). The

terminology and measurement were used following the standard methods described by Mahunka (1991) and Bayartogtokh (2010).

Results and Discussion

Description of a new record to Korean inventory

Genus *Phauloppia* Berlese, 1908 민지게응애속 (신칭)
Calvoppia Jacot, 1934
Eporibatula Sellnick, 1928
Imparatoppia Jacot, 1934
Paraliodes Hall, 1911
Trichoribatula Balogh, 1961

Type species. *Zetes lucorum* C.L. Koch, 1841: Vol. 31 (18).
= *Oppia conformis* Berlese, 1895: Vol. 7(77).

Diagnosis. Adult relatively large in size; lamella very thin, located in the middle of prodorsum; 14 pairs of setae, four and five pairs of porose area in notogaster; pteromorpha not developed; five pairs of genital setae; legs usually tridactylous (Weigmann, 2006; Bayartogtokh, 2010).
Distribution. Holarctic region, Australia and Neotropical region Australian (as described in Subías, Online version 2012).

***Phauloppia lucorum* (C.L. Koch, 1841)**
민지게응애 (신칭) (Figs. 1, 2)
Zetes lucorum C.L. Koch, 1841: Vol. 31(18).
Notaspis lucorum Michael, 1888: 371, pl. 30, figs. 1-5.
Oppia conformis Berlese, 1895: Vol. 7(77).
Eremaeus schneideri Oudemans, 1900a: 89; 1900b: 136, pl. 8, figs. 41, 42.
Eremaeus conjuncuts Oudemans, 1902: 54; 1905: 205, pl. 8, figs. 12, 13.
Phauloppia conformis Sellnick, 1928: 37, fig. 86; Mahunka and Mahunka-Papp, 1995: 166, figs. 82-84.
Phauloppia lucorum Grandjean, 1948: 24; 1950: 344; Sellnick, 1960: 126; Travé, 1961: 336; Moraza *et al*., 1980: 17, fig. 64; Mahunka, 1991: 764, figs. 74-77; Pérez-Iñigo, 1993: 236, fig. 84C; Weigmann, 2006: 431, abb. 231a, b.

Material examined. One mite marked on the slide. Straw mat covering the cherry tree, Andong National University, Andong, Gyeongsangbuk-do, Korea, 8. I. 2012.
Diagnosis. Length of body 690 μm and width 471 μm. Body color yellowish brown. Cerotegumental layer covering the cuticle surface, well foveolate on the notogater. Some ribs on the posterior margin of body also well observable.

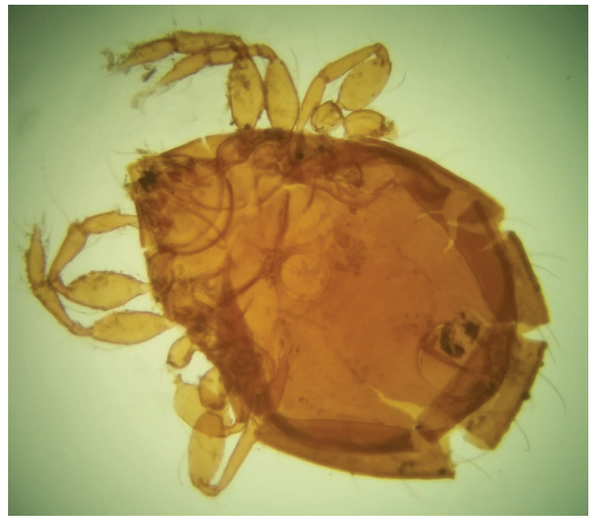

Fig. 1. Microscopic image of *Phauloppia lucorum* (C.L. Koch, 1841).

Prodorsum: tip of rostrum nasiform, it is well observable also in lateral view, rostral setae (*ro*) setiform; lamellar and interlamellar ones blunt at tip. Decurrent from outer side of interlamella setae (*in*) to inner side of lamellar setae (*le*), costula thin; sensillus (*ss*) short and head spherical with granular surface structure.

Notogaster: wide, nearly round; anterior border of notogaster convex and posterior outline sinuous; fourteen pairs of ciliate notogastral setae and no considerable differences among the notogastral setae; four pairs of porose areas visible and *Aa* ribbon-shaped, very long, much longer than the others.

Ventral side: epimeral borders characteristically fused, composing a transversal band in front of genital aperture. Setal formula of epimera: 3-1-3-3, all epimeral setae simple and thin. epimeral surface irregularly ornamented with spots or weak polygonal reticulation; a similar, but a more regular sculpture observable on the ventral plate, some longitudinal ribs also present on it laterally.

Legs: all leg homotridactylous; femur, tibia and tarsi with porose areas; two round areas present on the tarsi.
Distribution. Korea (new record), Western and central parts of Europe, Mongolia (as described in Bayartogtokh, 2010).
Remarks. All the known of the genus *Phauloppia* were described as having four or five pairs of the porose. This species is having four pairs of porose among which *Aa* is found longer and narrow in comparison to other species belonging to this genus.
Deposition. NIBR No. NIBRIV0000325964.
Identifiers. Jiwon Kim, Badamdorj Bayartogtokh and Chuleui Jung.

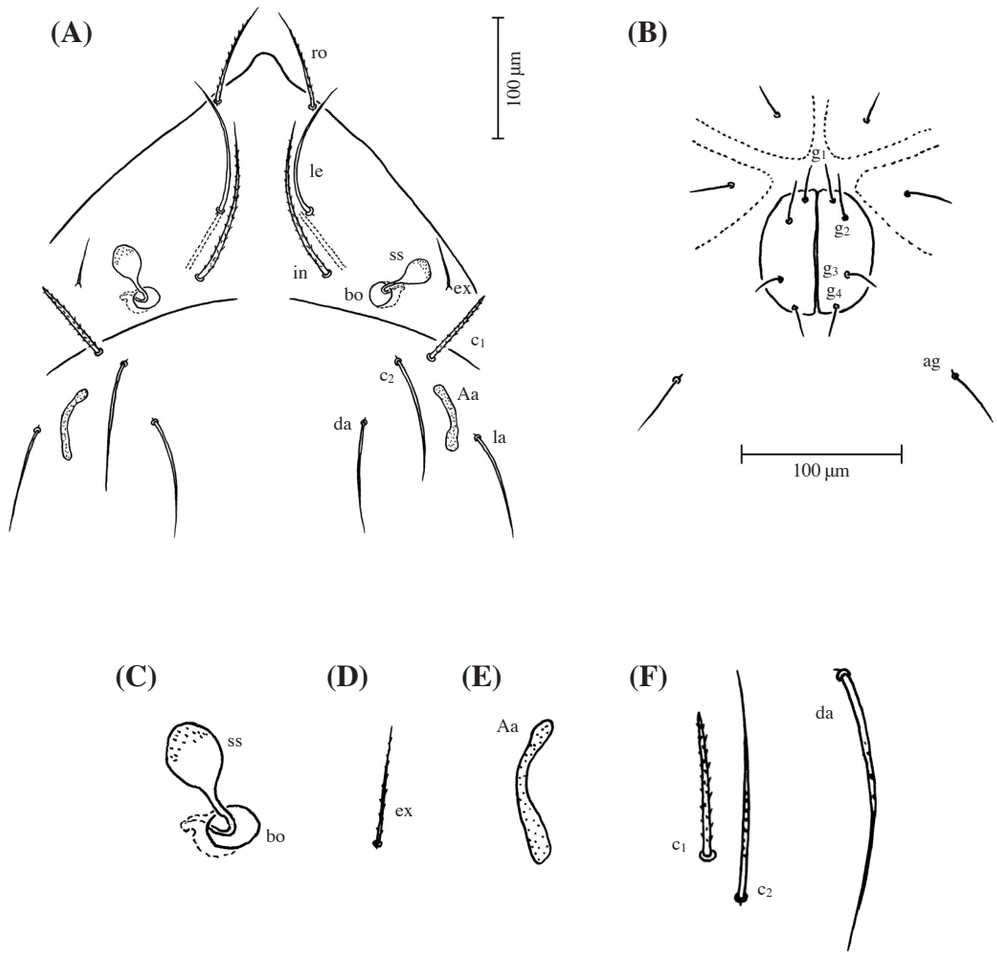

Fig. 2. *Phauloppia lucorum* (C.L. Koch, 1841). (A) Prodorsum and anterior part of notogaster. (B) Genital region with setae. Genital setae: g_1, g_2, g_3, g_4, g_5; Aggenital seta: *ag*. (C) Sensillus (*ss*) and bothridium (*bo*). (D) Exobothridial seta (*ex*). (E) Porose area *Aa*. (F) Notogateral setae: c_1, c_2, *da*.

Key to genera of the family Oribatulidae Thor, 1929 in Korea

1. Lamella and translamella fully developed; 4 or 5 pairs of genital seta ····· 2
− Without continuous translamella; lamella reduced significantly or on a vague line ····· 3
2. Lamella is little convergent extending significant (partly with Cuspides); Translamella is well developed; 13-14 pairs of notogatral seta; 4 pairs of genital seta ····· ····· ***Zygoribatula* Berlese, 1916**
− Lamella strongly convergent without Cuspides; translamella designed narrow; 14 pairs of notogastral seta; 4-5 pairs of genital seta ····· ***Lucoppia* Berlese, 1908**
3. The lamellae are fine line, not connected to bothridium; c_1 and c_2 situated close together; strong with 14 pairs of notogastral seta ···· ***Phauloppia* Berlese, 1908**
− Lamellae wide often extended to the top; fine with 13-14 pairs of notogastral seta ·· ***Oribautla* Berlese, 1895**

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