Taxonomic Review of the Psocids (Psocoptera) in Korea

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ABSTRACT: The psocids of Korea are reviewed based on museum collections and recently collected material. To date, only 14 species of 7 families in 3 suborders (Trogiomorpha, Troctomorpha and Psocomorpha) of Psocoptera have been recorded. In the present study, 10 additional species belonging to 2 suborders [Troctomorpha] Amphientomidae: Ancylentomus macrourus (Li, 1997); [Psocomorpha] Amphipsocidae: Amphipsocus japonicus (Enderlein, 1906), Caeciliusidae: Valenzuela oyamai (Enderlein, 1906), Paracaecilius japonicus (Enderlein, 1906), Stenopsocidae: Cubipilis aphidiformis (Enderlein, 1906), Stenopsocus immaculatus (Stephens, 1836), Peripsocidae: Peripus didymus Roesler, 1939, Psocidae: Amphigerontia anchorae Li, 2002, Psococerastis tokyoensis (Enderlein, 1906) and Trichadenopsocus alternatus Li, 2002, were found to occur in Korea for the first time. Adult morphology, taxonomic diagnosis and photographs of diagnostic characters of the newly recorded species in Korea are provided.

Key words: Psocoptera, Taxonomy, New record, Korea

Barklice or Booklice, commonly called psocids, are small and inconspicuous scavenging insects of the order Psocoptera (Mockford, 1989). They feed on fungi, algae, lichen, and organics like detritivore, and some are treated as polyphagous pest of stored food products worldwide (Green and Turner, 2005). The psocids usually overlooked by the researchers despite its relative diversity (Mockford, 1989). Recently many of them have been described, more than 5,500 species in three suborders (Li, 2002; Lienhard and Smithers, 2002; Yoshizawa, 2002). In Korea, only 14 species have been recorded so far (Hong and Woo, 1992; Park and Lee, 2014).

In this study, specimens from recent field work and material in museum collections were examined to investigate the taxonomy of Korean Psocoptera. This paper reports 10 species new to Korea and provides the checklist of Korean psocoptera with diagnosis and some biological information such as distribution.
Materials and Methods

Most specimens were collected by beating and were stored in 70% or 95% ethanol after collection for subsequent slide mounting and identification. Each specimen was permanently mounted on microscopic slide following slide mounting methods for psyllids and thrips with some modification (Anonymous, 2009; Hollis, 2004). Material was examined and deposited in Department of Plant Medicine, Suncheon National University, Suncheon, Korea (SCN). The abbreviations used in this study are as follows: CN (Chungnam province), GG (Gyeonggi province), GW (Gangwon province), JJ (Jeju province), JN (Jeonnam province).

The list is arranged alphabetically using the classification of Smithers (1972).

Results

In this paper, we report 10 species of Psocoptera new to Korea (Table 2) and previously reported 14 species belonging to 3 suborders are also presented (Table 1).

Suborder Troctomorpha
Infraorder Amphientometae
Family Amphientomidae Smithers, 1972 비늘다듬이벌레과 (신칭)

Table 1. Checklist of Psocoptera in Korea before the present study

<table>
<thead>
<tr>
<th>Suborder</th>
<th>Infraorder</th>
<th>Family</th>
<th>Scientific name</th>
<th>Korean name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trogiomorpha</td>
<td>Atropetae</td>
<td>Trogiidae</td>
<td>1. Lepinotus reticulatus Enderlein, 1905</td>
<td>가루민다듬이벌레</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2. Trogium pulsatorium (Linnaeus, 1758)</td>
<td>분다듬이벌레</td>
</tr>
<tr>
<td>Troctomorpha</td>
<td>Nanopsocetae</td>
<td>Liposcelidae</td>
<td>3. Liposcelis divinatoria (Müller, 1776)</td>
<td>책다듬이벌레</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>4. Liposcelis entomophila (Enderlein, 1907)</td>
<td>어울다듬이벌레</td>
</tr>
<tr>
<td>Psocomorpha</td>
<td>Caeccilietae</td>
<td>Amphipsocidae</td>
<td>5. Kolbia fuscovittata (Enderlein, 1906)</td>
<td>턱다듬이벌레</td>
</tr>
<tr>
<td>Homilopsocidea</td>
<td></td>
<td>Ectopsocidae</td>
<td>6. Ectopsocopsis cryptomeriae (Enderlein, 1907)</td>
<td>삼나무외다듬이벌레</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Lachesilidae</td>
<td>7. Lachesilla pedicularia (Linnaeus, 1758)</td>
<td>에기탈다집벌레</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Pseudocaeccilietae</td>
<td>8. Pseudocaeccilius maculosus Enderlein, 1907</td>
<td>온돌다듬이벌레</td>
</tr>
<tr>
<td>Psocetae</td>
<td></td>
<td>Psocidae</td>
<td>9. Amphigerontia contaminata (Stephens, 1836)</td>
<td>검정다듬이벌레</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>10. Loesia fasciata (Fabricius, 1787)</td>
<td>음복다듬이벌레</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>11. Metaceras longiceps (Stephens, 1836)</td>
<td>다듬이벌레</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>12. Neoblaste papillosa Thornton, 1960</td>
<td>흉나다듬이벌레</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>13. Psocus bipunctatus (Linnaeus, 1761)</td>
<td>덩다듬이벌레</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>14. Sigmatoneura kolbei (Enderlein, 1906)</td>
<td>감청수염다듬이벌레</td>
</tr>
</tbody>
</table>

Table 2. Newly recorded species of Psocoptera in the present study

<table>
<thead>
<tr>
<th>Suborder</th>
<th>Infraorder</th>
<th>Family</th>
<th>Scientific name</th>
<th>Korean name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Troctomorpha</td>
<td>Amphientometae</td>
<td>Amphientomidae</td>
<td>1. Ancylentomus macrourus (Li, 1997)</td>
<td>비늘다듬이벌레</td>
</tr>
<tr>
<td>Psocomorpha</td>
<td>Caeccilietae</td>
<td>Amphipsocidae</td>
<td>2. Amphipsocus japonicus (Enderlein, 1906)</td>
<td>일본벌다듬이벌레</td>
</tr>
<tr>
<td></td>
<td>Caecciliidae</td>
<td></td>
<td>3. Valenzuela oyamai (Enderlein, 1906)</td>
<td>밝은깃 والفيلة벌레</td>
</tr>
<tr>
<td></td>
<td>Stenopsocidae</td>
<td></td>
<td>4. Paracaecilius japonicus (Enderlein, 1906)</td>
<td>깃 والفيلة벌레</td>
</tr>
<tr>
<td>Homilopsocidea</td>
<td>Peripsocidae</td>
<td></td>
<td>5. Cubipilis aphidiformis (Enderlein, 1906)</td>
<td>진티연문다듬이벌레</td>
</tr>
<tr>
<td>Psocetae</td>
<td>Psocidae</td>
<td></td>
<td>6. Stenopsocus immaculatus (Stephens, 1836)</td>
<td>투명연문다듬이벌레</td>
</tr>
<tr>
<td></td>
<td>Peripsocidae</td>
<td></td>
<td>7. Peripsocus didymus Roesler, 1939</td>
<td>청다듬이벌레</td>
</tr>
<tr>
<td></td>
<td>Psocidae</td>
<td></td>
<td>8. Amphigerontia anchoragei Li, 1989</td>
<td>목사다듬이벌레</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>9. Psococerasis tokyoensis (Enderlein, 1906)</td>
<td>줄다듬이벌레</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>10. Trichadenopsocus alternatus Li, 2002</td>
<td>점무늬다듬이벌레</td>
</tr>
</tbody>
</table>
**Ancylentomon macrourus** (Li, 1997) 비늘다듬이벌레(신칭)
*Ancylpsocus macrourus* Li, 1997: 388. [TL: China]

**Diagnosis.** Body (Fig. 1) dark brown. Head (Fig. 10) brown, antenna 15 segments, lacina with apex divided into a small median and broad tooth. Forewing (Fig. 18) brown, while wing apex light-brown, scale on wing presence. Rs connected to M by across vein. Areola usually long. Cu₂ and 1A end in modulus. Epiproct and paraproct with numerous of setae (Fig. 28).


**Distribution.** Korea (new record), China.

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**Paracaecilius japonicus** (Enderlein, 1906) 일본비늘다듬이벌레(신칭)

**Diagnosis.** Body (Fig. 1) dark brown. Head (Fig. 10) brown, antenna 15 segments, lacina with apex divided into a small median and broad tooth. Forewing (Fig. 18) brown, while wing apex light-brown, scale on wing presence. Rs connected to M by across vein. Areola usually long. Cu₂ and 1A end in modulus. Epiproct and paraproct with numerous of setae (Fig. 28).


**Distribution.** Korea (new record), China.

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**Stenopsocus immaculatus** (Enderlein, 1906) 백색비늘다듬이벌레(신칭)

**Diagnosis.** Head and wings are strongly pubescent (Figs. 2 and 11). Forewing (Fig. 19) with pterostigma with strong posterior angle and with a spur vein arising. Vein C thickened in region of pterostigma and anterior margin. Rs an M fused for a short length or meeting in a point, Rs branches long.

**Materials examined.** [JN] 5 exs., Hwaeom temple, Gurye, 6.ix.2015 (K.-J. Hong).

**Distribution.** Korea (new record), Japan.

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**Amphipsocus japonicus** (Enderlein, 1906) 일본털다듬이벌레(신칭)

**Diagnosis.** Body (Fig. 3) including wings are dark brown. Forewing (Fig. 20) length 2.5 mm, with three of white small

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**Cubipilis aphidiformis** Enderlein, 1906: 251. [TL: Japan]

**Diagnosis.** Head and wings are strongly pubescent (Figs. 2 and 11). Forewing (Fig. 19) with pterostigma with strong posterior angle and with a spur vein arising. Vein C thickened in region of pterostigma and anterior margin. Rs an M fused for a short length or meeting in a point, Rs branches long.

**Materials examined.** [JN] 5 exs., Hwaeom temple, Gurye, 6.ix.2015 (K.-J. Hong).

**Distribution.** Korea (new record), Japan.

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**Valenzuela oyamai** (Enderlein, 1906) 밝은깃털다듬이벌레(신칭)

**Diagnosis.** Body (Fig. 3) including wings are dark brown. Forewing (Fig. 20) length 2.5 mm, with three of white small
area, margin and veins setose, the hair of the veins in one low. Areola postica free and pterostigma not connect to Rs. Rs and M fused for a length; Cu₂ without setae.


Distribution. Korea (new record), Japan, China, Taiwan, Russian Far East.

Paracaecilius japonicus (Enderlein, 1906) 깃털다듬이벌레
(Caecilius japonicus Enderlein, 1906: 254. [TL: Japan]

Diagnosis. Body including wings is brownish-yellow (Fig. 4), Head (Fig. 12) brow, eyes dark brown. Forewing (Fig. 21) length 3 mm, pale brownish-yellow; veins brownish-yellow. Pterostigma yellow, hairy, narrow; r₁ is not a corner. Veins and margin with the exception of analis 1 row hairy, hairy only the edge with the exception of Costa in the hind wing.


Distribution. Korea (new record), China, Japan, Taiwan.

Family Stenopsocidae Wong et Thornton, 1968 연문다듬이벌레과

Cubipilis aphidiformis (Enderlein, 1906) 진디연문다듬이벌레
Stenopsocus aphidiformis Enderlein, 1906: 249. [TL: Japan]

Diagnosis. Body in alcohol of this species is characterized by pale yellowish brown (Fig. 5), Head with brown marking around ocilli. Wings transparent. Forewing with pterostigma elongate, little color pattern, Cu₂ with setae (Fig. 22).


Distribution. Korea (new record), Japan, China, Taiwan, Russian Far East.

Stenopsocus immaculatus (Stephens, 1836) 투명연문다듬이벌레
Psocus immaculatus Stephens, 1836: 125. [TL: Europe]

Psocus rufescens Stephens, 1836: 125. [TL: Europe]
Psocus flavescens Stephens, 1836: 125. [TL: Europe]
Psocus venosus Stephens, 1836: 121. [TL: Europe]
Psocus strigosus Burmeister, 1839: 776. [TL: Europe]
Psocus subfumipennis Zetterstedt, 1840: 1053. [TL: Europe]
Psocus flavicans Zetterstedt, 1840: 1054. [TL: Europe]

**Diagnosis.** A moderately large barklice (5-6 mm) often with green abdomen (Fig. 6). Head brown with round compound eyes, maxillary palpus long and slender, tip of the distal tarsomere gray, eyes dark (Fig. 13). Areola postica joined to median vein. Forewing without distinct markings. Vein Cu₂ setose with short hairs (setae) along vein. Pterostigma elongate, narrow, expanded slightly at pterostigmal crossvein. Cu₁s to M crossvein long. Fore wing margin obviously setose for whole length to Cu₂ (Fig. 23).


**Distribution.** Korea (new record), Palaearctic.
Infraorder Homilopsocidea

Family Peripsocidae Roesler, 1944 창다듬이벌레과(신칭)

*Peripsocus didymus* Roesler, 1939 창다듬이벌레(신칭)

*Peripsocus didymus* Roesler, 1939: 170. [TL: Germany]

*Peripsocus didymus truncatus* Badonnel, 1943: 93.

[TL: France]

*Peripsocus didymus silesiaca* Obr, 1948: 2.

[TL: Czechoslovakia (former)]

*Peripsocus truncatus* Badonnel et Pearman 1971: 88. [TL: Great Britain]

**Diagnosis.** A medium size brown barklice (Fig. 7). Head brown and vertex round (Fig. 14). Forewing uniformly pale brown occasionally with dark mark (Fig. 24). Male phallosome with sclerite arms crossing. Female subgenital plate Y shape, the lobe at the apex of the plate narrows very slightly at the end (Fig. 32). Paraproct semicircle shape, epiproct trapezium shape both are with numerous of setae at posterior (Fig. 29).


**Distribution.** Korea (new record), Japan.
Infraorder Psocetae

Family Psocidae Hagen, 1865 다듬이벌레과

Amphigerontia anchonae Li, 1989 목서다듬이벌레(신칭)

Amphigerontia anchonae Li, 1989: 44. [TL: China]

Diagnosis. This barklouse is large body size (Fig. 8). Head and compound eyes (Fig. 15) round with brown color. Forewing (Fig. 25) with Rs and M joined by a well-developed cross vein. Discoidal cell narrow, sides nearly paralleled but a little convergent towards distal end. Apex of areola postica longer than the first section of Cu1 between R2+3 and R4+5. Paraproct subtriangular, posterior setae present, epiproct triangular, longer than wide, with setae along sides posterior (Fig. 30). Subgenital plate (Fig. 34) the apex of lobe with setae.

Materials examined. [JN] 13 exs., Gurye, 18.v.2016, on Osmanthus fragrans (K.-J. Hong).

Distribution. Korea (new record), China.

Psocerasis tokyoensis (Enderlein, 1906) 줄다듬이벌레(신칭)

Psocus tokyoensis Enderlein, 1906: 245. [TL: Japan]

Diagnosis. Body (Fig. 9) dark brown, head (Fig. 26) shortly pubescent. Antennae a little longer than fore wing. Forewing (Figs. 2, 3) with basal Sc ending free. Rs an M fused for a length. Paraproct (Fig. 31) short pubescent. Subgenital plate shape T like, lobe at the apex with long setae (Fig. 35).


Distribution. Korea (new record), Japan, Taiwan.

Trichadenopsocus alternatus Li, 2002 절무늬다듬이벌레(신칭)

Trichadenopsocus alternatus Li, 2002: 1491. [TL: China]

Diagnosis. Body and head brown with large eyes (Fig. 17), Antenna not much longer than forewing. Forewing (Fig. 27) strongly patterned. Areola postica almost triangular shape. Rs and M fused for some distance.

Materials examined. [GG] 1 ex., Gwangreung (Korea National Arboretum), Pocheon, 12.viii.2014 (K.-J. Hong).

Distribution. Korea (new record), China.

Remarks. This species could not support habitus photo, because we found only one specimen and body was damaged.

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Literature Cited
