Taxonomic Review of the Korean Pyrgotidae
(Insecta: Diptera: Tephritoidea)

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ABSTRACT

Pyrgotidae is a small acalyptrate family including about 370 species worldwide and little attention has been given to their systematics until recently. Latest changes in taxonomic status of some of the Korean species made this review inevitable. In the present study, the Korean pyrgotid species are reviewed with discussion of their taxonomic status. We also provide a revised key to all 14 Korean species (seven Adapsilia, three Eupyrgota, two Parageloemyia, one Porpomastix, and one Tephritopyrgota species) supplemented by digital images to facilitate accurate identification.

Key words: endoparasitoid, nocturnal, pyrgotid fly, Palaearctic, taxonomy

INTRODUCTION

The family Pyrgotidae includes typically pictured wing flies with larvae feeding in adult scarab beetles as endoparasitoids. They are mainly nocturnal as their host insects do, and little is known about their ecology, behavior, and host relationships. About 370 nominal species in 55 genera of pyrgotid flies have been recorded worldwide, predominantly in tropics (Korneyev, 2004, 2006a, b). Almost all earlier taxonomic studies on the Palaearctic fauna had been conducted by Enderlein (1942), Hendel (1908, 1914, 1933, 1934), and Hering (1940). Later, Chen (1947) and Shi (1996) revised Chinese/Japanese and Chinese species, respectively, without examining earlier types, which were deposited in several museums in Europe and the United States.

For the Korean fauna, Kim and Han (2000, 2001) conducted systematic studies with recognition of 14 species. For these studies, unfortunately, the type specimens had not been accessible. Prior to these studies, a single misidentified species, Eupyrgota fusca (as Adapsilia fusca) had been known from Korea (Kim, 1987), which was subsequently described as a new species, Adapsilia hispida by Kim and Han in 2001.

Recently Korneyev (2004) recorded 22 species of five genera in a comprehensive generic revision of the Palaearctic pyrgotids on the basis of the type specimens available from the major museums. In this study, the following generic synonyms were established: Adapsilia (=Epicerella, Teliophleps); Porpomastix (=Paradapsilia); Parageloemyia (=Dicranostira). Korneyev (2004) also synonymized some species treated by Kim and Han (2000, 2001).

In the present study, we reviewed the Korean pyrgotid species based on Korneyev’s studies (2004, 2007) and discussed their taxonomic status. We also provide a revised key to all 14 Korean pyrgotid species supplemented by high-resolution digital images of both sexes to facilitate the accurate identification.

MATERIALS AND METHODS

Morphological terminology and interpretations largely follow White et al. (1999) and Korneyev (2004, 2006a). Consecutive digital images in different focal planes (usually 10 or more shots per a specimen) were taken with a digital camera (Panasonic DMC FZ50) and the images were Z-stacked using Helicon Focus® software (Helicon Soft, Ltd.).

The voucher specimens used in this study are deposited in the Division of Biological Science and Technology, Yonsei University, Wonju Campus, Korea (YSUW). The abbreviations of the institutions mentioned in the text are as follows: Deutsches Entomologisches Institut (DEI); Institute of Zoology, Academia Sinica (IZAS); United States National Museum of Natural History (USNM); Zoological Institute, Russian Academy of Sciences (ZISP).

SYSTEMATIC ACCOUNTS

Order Diptera
Superfamily Tephritoidea
Family Pyrgotidae Schiner, 1868
Key to the species of the Korean Pyrgotidae

1. Apical half of femora armed with row of short spine-like setulae (Fig. 6D); arista apparently bare; oviscape apically with pair of medioventral hooks (Figs. 6E, 5B, F) ........................................ 2

- Apical half of femora without such short spine-like setulae; at least basal half of arista short pubescent; oviscape apically without medioventral hooks .................... 4

2. Single pair of scutellar setae (Fig. 6B, C); face with median carina weakly developed (Fig. 6D); body yellow with black or dark brown patterns (Fig. 6A-C) .......................... Eupyrgota tigrina (Kim and Han)

- Two or more pairs of scutellar setae; face with median carina sharply angled (as in Fig. 8F); body coloration not as above .................... 3

3. All setae and setulae black; body yellowish brown ground color with blackish brown patterns (Fig. 5A, B, D); fore trochanter with group of spinulose setulae ventrally (Fig. 5B); midfemur with anteroapical bare area in female (Fig. 5C) .......................... Eupyrgota luteola (Coquillet)

- All setae and setulae reddish brown; body entirely yellowish red to reddish brown without dark pattern (Fig. 5E-G); fore trochanter without short ventral setulae; midfemur without bare area in female .......................... Eupyrgota rufosetosa (Chen)

4. Both ocellar and basal scutellar setae reduced (Fig. 8A, C); arista apparently 3-segmented (Fig. 8B); face with three triangular dark spots (Fig. 8D) .......................... Porpomastix fasciolata (Enderlein)

- Ocellar and/or basal scutellar setae clearly present; arista apparently 2-segmented; face without such dark spots ........................................ 5

5. Three pairs of dorsocentral setae well developed in both sexes (Fig. 7B, D, E, G); single pair of acrostichal setae; scutellum bare; R_{2+3} always without spurious vein (Fig. 7A, F); face with median carina weakly developed (Fig. 7C); oviscape with dark brown apex (Fig. 7A, B, E, F) .................. 6

- One or two pairs of dorsocentral setae present; if three pairs (occasionally in some females), then scutellum setulose (Figs. 3A, 8E, G); acrostichal setae absent; if present, then body and scutellum covered with long dense setulae (Fig. 1G); R_{2+3} with/without spurious vein; face with median carina clearly developed; oviscape without brown apex ........................................ 7

6. R_{1+5} dorsally setulose (Fig. 7B); wing hyaline with gray bands (Fig. 7A); dark brown spot present between post-sutural supra-alar seta and wing base (Fig. 7A) .......................... Parageloemyia quadriseta (Hendel)

- R_{1+5} without dorsal setulae; wing grayish, mottled with numerous hyaline spots (Fig. 7E-G); area between post-

sutural supra-alar seta and wing base without dark brown spot .................. Parageloemyia wonjuensis (Kim and Han)

7. Antennal pedicel about twice as long as first flagellomere in dorsal view (Figs. 1A, 2A) .......................... 8

- Antennal pedicel about as long as first flagellomere in dorsal view .................... 9

8. Single pair of orbital setae (Fig. 1B, C); scutum and scutellum reddish yellow (Fig. 1B, C); thoracic stripes reddish yellow, indistinct (Fig. 1B, C); subocular spot clearly present (Fig. 1A, D); midfemur without bare area in female .......................... Adapsilia coarctata (Waga)

- Two pairs of orbital setae (Fig. 2B); scutum and scutellum brownish yellow with brown to dark brown patterns (Fig. 2B); thoracic stripes dark brown, distinct but largely fused (Fig. 2B); subocular spot not clear (Fig. 2A); midfemur with anteromedial bare area in female (Fig. 2D) .................. Adapsilia longifasciata (Kim and Han)

9. Arista entirely short pubescent ........................................ 10

- At least apical half of arista apparently bare (Figs. 2E, 3B) .......................... 13

10. Wing cell m brownish gray with 4-5 hyaline spots (Fig. 8E, G); 3-4 pairs of scutellar setae (Fig. 8G); oviscape at least twice as long as preabdomen (Fig. 8F) .......................... Tephritopyrgota ferruginea (Walker)

- Wing cell m not as above; 1-2 pairs of scutellar setae; oviscape distinctly less than twice as long as preabdomen ........................................ 11

11. Body and scutellum covered with long dense setulae (Fig. 1F, G); wing short in comparison with thorax (wing-thorax ratio 1.92) (Fig. 1G); oviscape medially with hump (Fig. 8E of Kim and Han, 2001) ....... Adapsilia hispida (Kim and Han)

- Body and scutellum without such long dense setulae; wing moderate to large in comparison with thorax (wing-thorax ratio at least 2.50); oviscape without ventral hump ........................................ 12

12. Apex of R_{2+3} slightly bent anteriorly (Fig. 4B); face with median carina brown to dark brown (Fig. 4B); subocular spot clearly present (Fig. 4B); scutum, scutellum, and pleura with brown to dark brown patterns (Fig. 4A, C); oviscape subapically with dorsal projection (Fig. B) .................. Adapsilia verrucifer (Hendel)

- Apex of R_{2+3} straight (Fig. 3E); median carina concolorous with other parts of face (Fig. 3E); subocular spot not clear (Fig. 3E); scutum, scutellum, and pleura brownish yellow without dark patterns (Fig. 3E, F); oviscape without dorsal projection .......................... Adapsilia ochrosoma (Kim and Han)

13. Postscutellar seta present; wing hyaline with discal and apical bands (Fig. 2E-H); arista gradually tapered toward apex (Fig. 2E); vein R_{4+5} more or less straight (Fig.
2H); face yellowish brown (Fig. 2F) ................................. Adapsilia mandschurica (Hering)

– Postocellar seta absent; wing grayish, mottled with numerous hyaline spots (Fig. 3A, B, D); basal 1/4 of arista thickened (Fig. 3B); vein R4+5 slightly curved anteriorly (Fig. 3D); face dark brown (Fig. 3C) ................................. Adapsilia microcera (Portschinsky)

Genus Adapsilia

Adapsilia Waga, 1842: 279 (type species: Adapsilia coarctata Waga by original designation).

Adapsilea: Enderlein, 1942: 106 (error).

Adapsila: Soós, 1984: 36 (error).

Pyrgota: Schiner, 1864: 66 (non Pyrgota Wiedemann, 1830).

Diagnosis. The genus Adapsilia may be distinguished by the combination of the following characteristics (Kim and Han, 2001; Korneyev, 2004): 1) wing hyaline with brownish pattern; 2) two pairs of scutellar setae; 3) 1-2 pairs of dorsocentral setae; 4) femora without row of ventral short spine-like setulae; and 5) oviscape apically without medioventral hooks.

Discussion. This genus includes 35 nominal species, 13 of which have been recorded from the Palaearctic Region (Kim and Han, 2001; Korneyev, 2004, 2007; Korneyev and Nartshuk, 2004). Preliminary phylogenetic analysis showed that the genus Adapsilia appears non-monophyletic (Kim and Han, 2001). Therefore, it may be considered as a heterogeneous assemblage of species that lacked derived characters of other pyrgotid genera. Recently Korneyev (2004) reviewed taxonomic status of Palaearctic species.

A female midfemoral bare area can be found scattered in three Korean pyrgotid genera (Adapsilia, Eupyrgota, and Parageloemyia), and, therefore, is not a good generic character. The shapes and positions of this structure, however, often provide good diagnostic characters at species level. For the Korean Adapsilia species, a bare area on female midfemur can be observed in A. longifasciata, A. ochrosoma, and A. verrucifer, of which it is more or less concave in A. ochrosoma and A. verrucifer. Non-concave bare area on midfemur can also be found in some Eupyrgota and Parageloemyia. Most Korean Adapsilia species have aristae entirely with microscopic pubescence except for A. mandschurica and A. microcera that have only basally pubescent aristae. All three Korean Eupyrgota species have entirely bare aristae.

It is notable that A. coarctata, A. longifasciata, and A. verrucifer share the row of conspicuous black setulae on lateral margins of sternite 2 and 3 in male (Figs. 1E, 2C, 4D). The function of this structure is unknown but might be something to do with their sexual behavior. It appears to be a synapomorphy of them, but extent of this characteristic for non-Korean species is unknown. It has been suggested that some members currently assigned to genus Adapsilia which do not possess setulose sternite 2 and 3 in male might belong to other genera (Korneyev, pers. comm.).

1. Adapsilia coarctata Waga (Fig. 1A-E)

Adapsilia coarctata Waga, 1842: 279 (type data unknown); Hendel, 1908: 14 (mentioned in generic description); Hendel, 1914: 79 (mentioned in key to world genera); Hendel, 1934: 147 (mentioned in key to selected Palaearctic and Afrotropical genera); Enderlein, 1942: 106 (mentioned in key to world genera); Chen, 1974: 69 (description); Aczél, 1958: 39 (in Ethiopian key); Stackelberg, 1970: 121 (in European part of the Russian key); Soós, 1984: 36 (in Palaearctic catalog); Zimina, 1985: 150 (Russian distribution); Merz, 1996: 406 (collection data); Shi 1996: 587 (Chinese distribution); Kim and Han, 2001: 264 (description); Korneyev, 2004: 23 (description); Korneyev and Nartshuk, 2004: 405 (in Russian Far East key); Nartshuk, 2004: 47 (note on distribution); Nartshuk and Korneyev, 2005: 3 (Russian Far East distribution).

Adapsilia alini Hering, 1940: 289 (type locality: China, “Charbin, Manchukuo”; holotype ♂, DEI); Korneyev, 2004: 23 (synonym of Adapsilia coarctata Waga).

Adapsilia alini: Soós, 1984: 36 (error).

Adapsilia coarctata: Soós, 1984: 36 (error).

Adapsilia (Adapsilia) coarctata: Hendel, 1933: 8 (description).

Diagnosis. This species can be readily distinguished from the congeners by its relatively long antennal pedicel (first flagellomere-pedicel ratio 0.42-0.44) and presence of subocular spot. Adapsilia longifasciata also has a relatively long pedicel, but its first flagellomere-pedicel ratio is 0.53-0.63. The presence of female midfemoral bare area of A. longifasciata and indistinct subocular spot further separates it from A. coarctata.

Distribution. Austria, Belgium, Switzerland, Italy, Hungary, Poland, Lithuania, Belarus, Ukraine, Russia, Mongolia, China, Korea, Japan.

Specimens available. 4♂, 3♀ (see Kim & Han (2001) for detail).

Discussion. This species is most widely distributed among the Palaearctic species but rare in collection, especially in Europe (Nartshuk and Korneyev, 2004).
**2. *Adapsilia hispida* Kim and Han (Fig. 1F, G)**

*Adapsilia hispida* Kim and Han, 2001: 271 (type locality: Korea, Gyeongsangbuk-do, Bonghwa-gun, Daehyeon-ri; holotype ♂, YSUW); Korneyev, 2004: 22 (suspected sy-
nonynmy with Adapsilia biseta Shi, 1996); Korneyev and Nartshuk, 2004: 405 (in Russian Far East key).

**Diagnosis.** This species can be distinguished by the combination of the following characteristics: 1) body including scutellum covered with long dense setulae; 2) wing relatively small (wing-thorax ratio, 1.92); and 3) female with ventral hump on oviscape. Male unknown.

**Distribution.** Korea.

**Specimens available.** Holotype ♂ (see Kim and Han (2001) for type data).

**Discussion.** As Korneyev (2004) noted, this species shares the following characteristics with A. biseta Shi: 1) presence of ventral hump on oviscape (Shi, 1996, Fig. 90-1325V1); 2) single pair of acrostichal setae; and 3) two pairs of dorso-central setae (Shi, 1996, Fig. 90-1325Bd). Based on such similarities, Korneyev (2004) suspected a synonymy of these two nominal species. According to the original description and figures, A. biseta differs from A. hispida mainly in number of setae on scutellum and wing banding patterns (Kim and Han, 2001, Fig. 8; Shi, 1996, Fig. 90-1325Bd, D). As the name implies, A. biseta has a single pair of scutellar setae with four long setae (Shi, 1996), but A. hispida clearly possesses two pairs of scutellar setae with eight long setae (Kim and Han, 2001). Since the holotypes of these species are the only known specimens, additional samples are needed to determine their conspecificity. It has been suggested that this species might belong to somewhere else other than Adapsilia (Korneyev, pers. comm.).

**1*3. Adapsilia longifasciata Kim and Han (Fig. 2A-D)**

*Adapsilia longifasciata* Kim and Han, 2001: 275 (type locality: Korea, Gyeongsangnam-do, Jinju-si, Gajwa-dong; holotype ♂, YSUW); Korneyev, 2004: 25 (taxonomic discussion); Korneyev and Nartshuk, 2004: 405 (in Russian Far East key).

*Adapsilia longifasciata*: Korneyev, 2004: 23 (error).

**Diagnosis.** This species closely resembles *A. coarctata* and *A. verrucifer*, but can be distinguished by the combination of the following characteristics: 1) subocular spot indistinct; 2) median carina concolorous with other parts of face; 3) a pair of dorso-central setae; 4) female with almost flat antero-medial bare area on midfemur; and 5) male sternites 2-3 with long erect lateral setulae.

**Distribution.** Korea.

**Specimens available.** 5♂, 10♀ (see Kim and Han (2001) for detail).

**2*4. Adapsilia mandschurica (Hering) (Fig. 2E-H)**

*Telioptele mandschurica* Hering, 1940: 288 (type locality: China, Heilongjiang, Weischaiche; holotype ♂, DEI); Soós, 1984: 37 (in Palaearctic catalog).

*Adapsilia breviantenna* Kim and Han, 2001: 261 (type locality: Korea, Gyeongsangbuk-do, Andong-si, Okjeong-dong, Andongdam; holotype ♂, YSUW); Korneyev, 2004: 26 (synonym of *Telioptele mandschurica* Hering).

*Adapsilia mandschurica*: Korneyev, 2004: 26 (description; combination from *Telioptele*); Korneyev and Nartshuk, 2004: 404 (in Russian Far East key).

**Diagnosis.** This species can be readily distinguished by the combination of the following characteristics: 1) face with median carina gently rounded; 2) antennal pedicel as long as first flagellomere; 3) apical half of arista bare; 4) female without bare area on midfemur; 5) vein R_{4+5} without spurious vein; and 6) sternites 2-3 without long erect lateral setulae in male.

**Distribution.** Korea, China.

**Specimens available.** 1♂, 7♀ (see Kim and Han (2001) for detail).

**3*5. Adapsilia microcera (Portschinsky) (Fig. 3A-D)**

*Pyrgota microcera* Portschinsky, 1892: 212 (type locality: Russia, Primorsky Kray, Amur (Wladiwostok); holotype ♂, ZISP).

*Adapsilia tenebrosa* Kim and Han, 2001: 279 (type locality: Korea, Gangwon-do, Wonju-si, Heungeob-myeon, Maeji-ri; holotype ♂, YSUW); Korneyev, 2004: 27 (synonym of *Adapsilia microcera* (Portschinsky)).

*Epicera microcera*: Hendel, 1933: 15 (description); Chen, 1947: 52 (taxonomic note); Soós, 1984: 37 (in Palaearctic catalog).

*Adapsilia microcera*: Korneyev, 2004: 27 (description, combination from *Epicera*); Korneyev and Nartshuk, 2004: 402 (in Russian Far East key); Nartshuk and Korneyev, 2005: 5 (in Russian Far East distribution).

*Pyrgo microcera*: Chen, 1947: 52 (error).

**Diagnosis.** This species can be readily distinguished by the combination of the following characteristics: 1) apical half of arista bare; 2) basal 1/4 of arista thickened; 3) postocellar seta absent; 4) face dark with subocular dilation high (0.74x as long as longest eye diameter); and 5) wing grayish, mottled with numerous hyaline spots.

**Distribution.** Korea, Russian Far East.

**Specimens available.** 2♂, 1♀ (see Kim and Han (2001) for detail).
Discussion. As far as known including the above specimens, acrostichal setae are absent in this species, but Nartshuk and Korneyev (2005, Fig. 1) found a single specimen with clear pair of acrostichal setae. We do not know this is simply an aberrant specimen or different species.

Largely due to its apparently different wing pattern, it has been suggested that this species might belong to somewhere else, probably near to Tephritopyrgota (Korneyev, pers. comm.), as it has been suggested from the preliminary phyllogenetic analysis (as A. tenebrosa in Kim and Han, 2001).

1*6. Adapsilia ochrosoma Kim and Han (Fig. 3E, F)

Adapsilia ochrosoma Kim and Han, 2001: 278 (type locality: Korea, Gyeongsangnam-do, Uiryong-gun, Garye-

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Fig. 2. Adapsilia longifasciata. A, D (midfemur in anterior view), female; B, C (abdomen in lateral view), male. A. mandschurica. E, F, female; G, H, male (abdomen removed).
myeon, Gabeul-ri, Mt. Jeogolsan; holotype ♀, YSUW); Korneyev, 2004: 28 (taxonomy); Korneyev and Nartshuk, 2004: 405 (in Russian Far East key).

**Diagnosis.** This species can be distinguished by the combination of the following characteristics: 1) pleura and scutum entirely brownish yellow with no dark patterns; 2) antenna with first flagellomere transversely oblong in outline; 3) R₂₊₃ with spurious vein; and 4) anteromedial bare area on midfemur.

**Distribution.** Korea.

Specimens available. 1 ♀ (see Kim and Han (2001) for type data).

**Discussion.** Since the female holotype is the only available specimen, it is uncertain whether the absence of dark pattern is specific characteristic or simply due to tenerality. Hence, more specimens are needed to determine the characters of body coloration.

**17. Adapsilia verrucifer Hendel (Fig. 4A-D)**

*Adapsilia (Adapsilia) verrucifer* Hendel, 1933: 10 (type
locality: China, Szechuan, near Tatsienlu; holotype ♀, USNM).

*Adapsilia cornugaster* Kim and Han, 2001: 267 (type locality: Korea, Gangwon-do, Wonju-si, Heunggeob-myeon, Maeji-ri; holotype ♂, YSUW); Korneyev, 2004: 29 (synonym of *Adapsilia verrucifer* Hendel).

*Adapsilia verrucifer*: Chen, 1947: 69 (description); Shi, 1996: 591 (description); Soós, 1984: 37 (in Palaearctic catalog); Korneyev, 2004: 29 (taxonomy); Korneyev and Nartshuk, 2004: 405 (in Russian Far East key).

*Adapsila verrucifer*: Soós, 1984: 37 (error).

**Diagnosis.** This species can be readily distinguished by the combination of the following characteristics: 1) apex of vein R$_{2+3}$ slightly bent anteriorly; 2) face with median carina brown to dark brown; 3) subocular spot present; 4) scutellum medially with brown pattern; 5) oviscape with dorsal projection; 6) anteromedial bare area present on female midfemur; and 7) sternites 2-3 with long erect lateral setulae in males.

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**Fig. 4.** *Adapsilia verrucifer*. A, B, female; C, D (abdomen in lateral view), male.
Distribution. Korea, China, Thailand.

Specimens available. 28♂, 125♀. (see Kim and Han (2001) for detail).

Discussion. All the female specimens collected in Korea clearly have dorsal subapical projections on oviscapes. However, Korneyev (2004) mentioned that a single female did not possess the dorsal projection but the structure of aculeus and other characters of that specimen fit well to A. verrucifer. We suspect that the Korneyev’s specimen might represent another species.

It is also noteworthy that the number of dorso-central seta is sexually dimorphic; always two pairs in females, but mostly single pair in male (if two pairs, anterior ones are poorly developed). This species was collected most abundantly using a mercury vapor light trap in July in Korea.

Genus Eupyrgota Coquillett

Eupyrgota Coquillett, 1898: 337 (type species: Eupyrgota luteola Coquillett by original designation).

Peltodasia Enderlein, 1942: 120 (type species: Peltodasia vespiformis Enderlein by original designation).

Diagnosis. This genus can be readily distinguished by the combination of the following characteristics (Kim and Han, 2000; Korneyev, 2004; Korneyev, 2006a, b): 1) presternum with a pair of finger-like lobes; 2) arista entirely bare; 3) antenna with first flagellomere as long as pedicel in dorsal view; 4) R2+3 always with spurious vein; 5) apical half of femora armed with row of short spine-like setulae; 6) oviscape apically with pair of medioventral hooks; and 7) wing with cell bcu and bm almost entirely bare in both sexes. Among the above characteristics, the presence of finger-like lobes of the pre sternum is a unique characteristic of Eupyrgota supporting monophyly of the genus (Korneyev, 2006a).

Discussion. The genus Eupyrgota has been once treated as a synonym or subgenus of Adapsilia (Hendel, 1914; Hendel, 1934; Steyskal, 1972; Soós, 1984), but is now ranked as a separate genus (Chen, 1947; Shi, 1996, Kim and Han, 2000, Korneyev, 2004; Korneyev, 2006a, b). This genus currently includes 11 nominal species in Palaearctic Region (Korneyev, 2004). However, a good number of species currently assigned to Adapsilia may actually belong to Eupyrgota (Korneyev, 2004; Korneyev, 2006a, b). Korneyev (2004, 2006a, b) noted that some members of Afrotropical and Palaearctic Adapsilia also have a pair of hooks on oviscape but differ in position and structure from that of Eupyrgota. Recently Korneyev (2006a, b) conducted revisions of Afrotropical Eupyrgota based on the examination of many type specimens.

1*8. Eupyrgota luteola Coquillett (Fig. 5A-D)

Eupyrgota luteola Coquillett, 1898: 337 (type locality: Japan, Mitsukuri; syntype 2♀, 1 with type number 4012, USNM; see Korneyev, 2004 for further discussion); Hendel, 1908: 17 (cited Coquillett’s original description); Matsumura, 1916: 409 (description); Enderlein, 1942: 119 (in key to world genera); Chen, 1947: 62 (description); Hirashima, 1989: 797 (in Japanese checklist); Shi, 1996: 583 (Chinese distribution); Kim and Han, 2000: 220 (description); Korneyev, 2004: 32 (type data); Korneyev and Nartshuk, 2004: 408 (in Russian Far East key).

Eupyrgota omorii Matsumura, 1916: 409 (type locality: Japan, Honshu, Morioka; holotype ♀, depository unknown); Hendel, 1933: 8 (cited Matsumura’s original description); Chen, 1947: 59 (description); Soós, 1984: 37 (in Palaearctic catalog).

Adapsilia luteola: Hendel, 1914: 83 (description); Malloch, 1929: 256 (in key to African genera); Hendel, 1934: 148 (in key to selected Palaearctic and Afrotropical species); Soós, 1984: 37 (in Palaearctic catalog).

Adapsilia (Eupyrgota) luteola: Hendel, 1933: 7 (cited Coquillett’s original description).

Diagnosis. This large-sized species can be readily distinguished from others by the combination of the following characteristics: 1) postocellar with pair of setal clumps, each of which includes 3-4 setae; 2) fore trochanter with group of spinulose setulae ventrally; and 3) anteroapical bare area present on female midfemur (half as long as femur).

Distribution. Korea, China, Japan, Taiwan.

Specimens available. 2♂, 14♀. (see Kim and Han (2000) for detail).

Discussion. This species is one of the largest pyrgotids in the Palaearctic Region. It is noteworthy that the numbers of scutellar (three to five pairs) and postalar setae (two pairs in female and single pair in male) are variable. They have been collected from June to July in Korea.

2*9. Eupyrgota rufosetosa Chen (Fig. 5E-G)

Eupyrgota rufosetosa Chen, 1947: 59 (Syntypes: China, Kiangsu, Chemo, 1♂; Chekiang, Mokan Shan, 1♀ 2♀; Chekiang, Chusan, 1♂; IZAS): Shi, 1996: 584 (Chinese distribution); Kim and Han, 2000: 224 (description); Korneyev and Nartshuk, 2004: 405 (in Russian Far East key).

Adapsilia (Eupyrgota) rufosetosa: Steyskal, 1977: 39 (in Oriental catalog).

Diagnosis. This species can be readily distinguished by the

1*큰풍뎅이파리, 2*노랑털풍뎅이파리
entirely reddish yellow to reddish brown setae and setulae. Distribution. Korea, China
Specimens available. 4♂, 12♀ (see Kim and Han (2000) for detail).

Discussion. Chaetotaxy of this species is extremely variable among the specimens examined. Dorsocentral setae: 2 pairs -3♂ 9♀; 1 pair-1♂ 3♀. Postalar setae: 2 pairs-1♂ 11♀; 1 pair-3♂ 1♀. Scutellar setae: 3 pairs-8♀; 4 pairs: 1♂; 3+4-2♂1♀; 4+3-2♀; 5+4-1♀; 4+5-1♂. In addition, scutellum is usually covered with sparse setulae (one to five), but

Fig. 5. Eupyrgota luteola. A, B, C (midfemur in anterior view), female; D, male. E. rufosetosa. E, F, female; G, male.
three (out of 16) specimens have entirely bare scutellum. Thus, it is important to realize the plasticity of their chaetotaxy to avoid possible misidentification.

1* 10. Eupyrgota tigrina Kim and Han (Fig. 6A-E)

*Eupyrgota tigrina* Kim and Han, 2000: 227 (type locality: Korea, Gangwon-do, Wonju-si, Maeji-ri; holotype ♂, YSUW); Korneyev, 2004: 32 (taxonomy); Korneyev and Nartshuk, 2004: 405 (in Russian Far East key).

**Diagnosis.** This species can be readily distinguished by the combination of the following characteristics: 1) body yellow with dark brown to black patterns; 2) face with median carina weakly developed; 3) face with triangular dark spots; 4) scutellum entirely bare with single pair of scutellar setae; and 5) anteroapical bare area on female midfemur densely with fine pale yellow setulae on ventral edge.

**Distribution.** Korea.

**Specimens available.** 46♂, 97♀ (see Kim and Han (2000) for detail).

**Discussion.** This species closely resembles *Euphya tripunctata* Doleschall, but females of *Eupyrgota tigrina* can be clearly distinguished by having bare area consistently situated at the apical portion of midfemur, whereas *E. tripunctata* as well as other *Euphya* species (Korneyev, personal observation) have basally situated bare areas on midfemora and no apicoventral hooks on the oviscape.

Korneyev (2004) suspected a synonymy of *Eupyrgota tigrina* with *Eupyrgota facialis* (Hendel, 1934) based on the following similarities found from a short original diagnosis (in the key): 1) single pair of scutellar setae (Korneyev erroneously noted two pairs); 2) ventral part of antennal groove and gena with brownish black spots; 3) femora ventrally

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Fig. 6. *Eupyrgota tigrina*. A, B, D, E (apex of abdomen in ventral view), female; C, male.
spinulose; and 4) pro sternum setulose (Korneyev, 2004). To confirm the identity of E. tigrina and E. facialis, the type material of E. facialis is needed to be re-examined. Almost all the specimens collected in Korea were attracted to mercury light at night. They make buzzing sound when they were captured.

Genus Parageloemyia Hendel
Parageloemyia Hendel, 1934: 142 (type species: Geloeomyia quadriseta Hendel by original designation).

Dicranostira Enderlein, 1942: 111 (type species: Parageloemyia ornata Hering by original designation, as Dicranostira ornata (Hering)).

Dicranostyra: Korneyev, 2004: 33 (error).

**Diagnosis.** The genus Parageloemyia can be readily distinguished from other pyrgotid genera by the combination of the following characteristics: 1) single pair of acrostical setae; 2) three pairs of dorsocentral setae; 3) absence of subcostal break; 4) face with median carina weakly developed; 5) scutellum entirely bare; and 6) oviscape straight or slightly up-curved in lateral view with dark apex.

**Discussion.** The genus Parageloemyia Hendel (1934) includes four nominal species from China, Korea, and Russia (Korneyev, 2004; Nartshuk and Korneyev, 2005). Korneyev (2004) revised the genus and synonymized Dicranostira ornata (Hering, 1940, originally described as Parageloemyia ornata) with Parageloemyia nigrofasciata (Hendel). The setulose R_{4+5} vein has been considered as a main diagnostic character of the genus Parageloemyia, but Korneyev (2004, 2006a) indicated that Trichempodia trifasciata (Enderlein, 1942) from Madagascar and some Eupyrgota latipennis (Walker, 1849) also had setulose R_{4+5}. It should be noted that Korneyev (2004) erroneously listed the type species of Parageloemyia as Geloeomyia nigrofasciata instead of Geloeomyia quadriseta (see, Hendel, 1934: 142).

1* 11. Parageloemyia quadriseta (Hendel) (Fig. 7A-D)
Geloeomyia quadriseta Hendel, 1933: 13 (type locality: China, Shin Kai Si, Mt. Omei, Szechuan; 2 syntype ♀, USNM); Soós, 1984: 37 (in Palearctic catalog).

Parageloemyia quadriseta: Hendel, 1934: 142 (mentioned in key to selected Palearctic and Afrotropical genera; Chen, 1947: 55 (description); Shi, 1996: 577 (Chinese distribution).

Parageloemyia nigrofasciata: Chen, 1947: 55 (misidentification); Kim and Han, 2001: 281 (misidentification).

**Diagnosis.** This species can be readily distinguished by the combination of the following characteristics: 1) round dark brown spot between poststural supra-alar seta and wing base; 2) vein R_{4+5} setulose; 3) fore tarsus with tarsomere 4-5 broad in female; and 4) anteromedial bare area present on female mid femur.

**Distribution.** Korea, China, Russia.

**Host.** Reared from Nipponoserica koltzei (Reitter, 1897) (Scarabaeidae: Melolonthinae) (Nartshuk and Korneyev, 2005).

**Specimens available.** 9♀, 18♂ (see Kim and Han (2001) for detail).

**Discussion.** As Korneyev (2004) noted, the wing figures of P. nigrofasciata (as G. nigrofasciata) and P. quadriseta (as G. quadriseta) (Hendel, 1933: Taf. 1) appeared to be switched and do not correspond to their respective descriptions and figure captions. Thus this has been a cause of confusion in species identification. Korneyev (2004) also suggested a possible synonymy of P. nigrofasciata and P. quadriseta. Almost all the Korean specimens have been collected from May to June.

2* 12. Parageloemyia wonjuensis Kim and Han
(Fig. 7E-G)
Parageloemyia wonjuensis Kim and Han, 2001: 285 (type locality: Korea, Gangwon-do, Wonju-si, Heungeob-myeon, Maeji-ri; holotype ♀, YSUW); Korneyev and Nartshuk, 2004: 408 (in Russian Far East key); Nartshuk and Korneyev, 2005: 9 (Russian Far East distribution).

**Diagnosis.** This species can be readily distinguished by the combination of the following characteristics: 1) wing grayish, mottled with numerous hyaline spots; 2) vein R_{4+5} bare; and 3) female without anteromedial bare area on mid femur.

**Distribution.** Korea, Russia.

**Specimens available.** 7♀, 27♂ (see Kim and Han (2001) for detail).

**Discussion.** This species lacks the previous diagnostic character of the genus (R_{4+5} setulose), but a preliminary phylogenetic analysis (Kim and Han, 2001) strongly suggested a close relationship with P. quadriseta (as P. nigrofasciata in Kim and Han, 2001). Most Korean specimens were collected using mercury vapor light trap from the end of April to mid May.

Genus Porpomastix Enderlein
Porpomastix Enderlein, 1942: 123 (type species: Porpomastix fasciolata Enderlein by original designation).
Paradapsilia Chen, 1947: 53 (type species: Paradapsilia trinotata Chen by original designation).

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**Diagnosis.** Moderate sized slender flies with broad wing and strongly curved long oviscape. This monotypic genus can be readily distinguished by the combination of the following characteristics: 1) antennal pedicel with dorsal finger-like projection; 2) arista 3-segmented; 3) both ocellar and basal scutellar setae absent; 4) cell bm bare in male, microtrichose in female; and 5) sternite 6 in female well developed, flap-like.

13. *Porpomastix fasciolata* Enderlein (Fig. 8A-D)
*Porpomastix fasciolata* Enderlein, 1942: 123 (Syntypes: Japan, Hokkaido (Morioka), Ohmorin, ♀; Russia, Primorsky Kray (Ussuri-Gebiet), ♂; ZMH); Soós, 1984: 38 (in Palaearctic catalog); Korneyev, 2004: 34 (description); Korneyev and Nartshuk, 2004: 408 (in Russian Far East key); Nartshuk and Korneyev, 2005: 9 (Russian Far East distribution).

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**Fig. 7. Parageloemyia quadrisea.** A, B, C, female; D, male. P. wonjuensis. E, F, female; G, male.
Paradapsilia trinotata Chen, 1947: 53 (type locality: Japan, Yokohama; 2♂ 1♀, IZAS); Asahina, 1956: 220 (description); Ito, 1993: 258 (description); Shi, 1996: 575 (Chinese distribution); Kim and Han, 2000: 231 (description).
Diagnosis. See generic diagnosis.

Distribution. Korea, China, Japan, Russia.

Specimens available. 9♂, 23♀ (see Kim and Han (2000) for detail).

Discussion. Specimens were collected from late April to mid June. They were primarily attracted to mercury light at night but about half of them were collected in daylight.

Genus Tephritopyrgota Hendel

Tephritopyrgota Hendel, 1914: 104 (type species: Tephritopyrgota passerina Hendel by original designation).

Euthioza Enderlein, 1942: 128 (type species: Euthioza madagascariensis Enderlein by original designation).

Stypina Enderlein, 1942: 105 (type species: Tephritopyrgota vesicatoria Hendel by original designation).

Tephrilopyrgota: Shi, 1996: 575, 591 (error).

Diagnosis. This genus can be distinguished by the combination of the following characteristics (modified from Korneyev (2004, 2007)): 1) absence of sclerotized subocular dilation; 2) wing gray with reticulate pattern; 3) face with median carina sharply angled; 4) female midfemur without bare area; and 5) vein R2+3 without spurious vein. In addition to the above list, the unpaired hook-like projection in female oviscape is considered as a diagnostic character (Korneyev, 2004). We removed it from the diagnosis because T. ferruginea does not have.

Discussion. The genus Tephritopyrgota Hendel (1914) is largely restricted to Afrotropical region. Currently only two species have been recorded from the Palaearctic Region; T. miliaria Hendel and T. ferruginea (Walker). This genus is unique among the Palaearctic genera by absence of sclerotized subocular dilation (Korneyev, 2006a, 2007).

1*14. Tephritopyrgota ferruginea (Walker) (Fig. 8E-G)

Trypeta ferruginea Walker, 1853: 387 (type locality: India; holotype ♂, BMNH).

Adapsilia longicaudata Kim and Han, 2001: 275 (type locality: Korea, Gyeongsangbuk-do, Yeongju-si, Punggi-eup, Mt. Sobaeksan, Huibang Valley; holotype ♂, YSUW); Korneyev, 2007: 70 (synonym of Tephritopyrgota ferruginea (Walker)).

Adapsilia longicauda: Korneyev, 2004: 30; 2007: 70 (error).

Tephritopyrgota ferruginea: Steyskal, 1977: 42 (in Oriental catalog); Korneyev, 2007: 70 (taxonomy).

Diagnosis. This species can be distinguished by the combination of the following characteristics: 1) subocular dilation absent; 2) face with median carina high and sharply angled; 3) three or more pairs of scutellar setae; and 4) oviscape twice as long as preabdomen, without a pair of hooks.

Distribution. Korea, India.

Specimens available. 2♂, 4♀ (see Kim and Han (2001) for detail).

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