A List of North Korean Tephritoid Species (Diptera: Tephritoidea) Deposited in the Hungarian Natural History Museum

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ABSTRACT

We here report nine species of Tephritidae and five species of Platystomatidae from North Korea deposited in the Hungarian Natural History Museum (five new Korean records marked with asterisks): Acidiella pachypogon, Campiglossa absinthii*, C. hirayamae, C. loewiana*, Sphaeniscus atilis, Tephritis brachyura*, Tephritis sinensis*, Trupanea amoena, Xanthomyia alpstris*, Rivellia alini, R. apicalis, R. asiatica, R. longialata, and R. nigroapicalis. Except for C. hirayamae, all other species are newly recorded in North Korea. As a result, a total of 22 tephritid and five platystomatid species are recognized for the North Korean tephritoid fauna. In South and North Korea together, a total of 120 nominal species of six tephritoid families are now officially recognized (1 Lonchaeidae, 1 Pallopteridae, 1 Ctenostylidae, 14 Platystomatidae, 14 Pyrgotidae, and 89 species of Tephritidae).

Keywords: Tephritidae, Platystomatidae, taxonomy, North Korea, HNHM

INTRODUCTION

Tephritoidea is a large superfamily of nine acalyptrate fly families including over 7,300 described species worldwide (Korneyev, 1999; Han and Ro, 2005): the Lonchaeidae, Piophilidae, Pallopteridae, Richardiidae, Ulidiidae, Platystomatidae, Pyrgotidae, Ctenostylidae and Tephritidae (including Tachiniscidae). The enigmatic family Ctenostylidae is here included in the superfamily based on our molecular study using mitochondrial DNA analysis (Han and Ro, in prep.).

Unlike South Korea where the tephritoid fauna is better known, only 14 species of the family Tephritidae (Dirlbek and Dirlbekova, 1972, 1974, 1975; Dirlbek, 1992) and no other tephritoid families are previously known from North Korea: Acanthonevra amurensis (Portschinsky, 1892); Anastrephoides matsumurai Shiraki, 1933 (as A. annulifera Hering, 1940); Anomoia expressa Dirlbek, 1992; Campiglossa defasiata (Hering, 1936) (as Paroxyma frolica Dirlbek and Dirlbekova, 1974); C. deserta (Hering, 1939) (as P. sada Dirlbek and Dirlbekova, 1974); C. hirayamae (Matsumura, 1916) (as C. matsumotoi Shiraki, 1968); Cornutrypeta spinifrons (Schroeder, 1913) (as Vidalia diddiba Dirlbek and Dirlbekova, 1975); Cornutrypeta superciliata (Frey, 1935) (as V. jibadawa Dirlbek and Dirlbekova, 1975); Paragastrozona japonica Miyake, 1919; Paratephritis takeuchii Ito, 1949; Pseudhemilea longistigma Shiraki, 1933; Tephritis carcassa Dirlbek and Dirlbekova, 1974; Tephritis femoralis Chen, 1938; and T. ismene Hering, 1953 (as T. separata Rondani, 1871). Dirlbek (1992) also mentioned the following three species as North Korean tephritids but was not sure about their identifications: Campiglossa parvula Loew, 1862, Oxyna lutulenta Loew, 1869, and Urophora mandschurica Hering, 1940. These records need to be verified based on actual examination of the voucher materials.

We were able to obtain a number of North Korean tephritoid specimens when YJK visited the Hungarian Natural History Museum (HNHM) in April, 1994. These specimens had been resulted from the expeditions made by Hungarian Entomologists between 1970 and 1977 (Park and Lee, 1991). Based on the HNHM collection we here report nine species of Tephritidae and five species of Platystomatidae, of which five tephritids are new to Korean Peninsula. Except for Campiglossa hirayamae, all other species are newly recorded in North Korea. Therefore, a total of 22 tephritid and five platystomatid species are now recognized for the North Korean tephritoid fauna.

In South and North Korea together, a total of 120 nominal species of six tephritoid families are now officially recognized: 1 Lonchaeidae (MacGowan, 2007); 1 Pallopteridae (Merz and Sueyoshi, 2002), 1 Ctenostylidae (Han, 2006), 14 Platystomatidae (Hara, 1987; Byun and Han, 2004), 14 Pyrgotidae (Kim and Han, 2009), and 89 species of Tephritidae (Han and Kwon, 2000; present study).

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MATERIALS AND METHODS

We follow Norrbom et al. (1998) and Wang (1998) for the current classification and distribution. We provide color photographs and diagnostic characters to aid identification of the included species. Consecutive digital images in different focal planes (usually 10 or more shots per a specimen) were taken with a digital camera (Panasonic DMC FZ50 mounted with Raynox DCR-250 macro filter) and the images were Z-stacked using Helicon Focus software (Helicon Soft, Ltd). Because most available North Korean specimens are in poor condition, we selected the photographs of South Korean specimens in better shape except for Campiglossa loewiana, Tephritis brachyura, and Xanthomyia alpestris.

The North Korean specimens used in this study are deposited in the Hungarian Natural History Museum, Budapest, Hungary (HNHM). All other specimens used for comparisons are deposited in the Division of Biological Science and Technology, Yonsei University, Wonju, Korea (YSUW). The abbreviations of the other institutions mentioned in the text are as follows: The Natural History Museum, Department of Entomology, London, England (BMNH); Deutsches Entomologisches Institut, Deutschen Akademie der Wissenschaften zu Berlin, Germany (DEI); Entomologisches Institut, Deutschen Akademie der Wissenschaften zu Berlin, Germany (ZMHU); Museum für Naturkunde der Humboldt Universität zu Berlin, Germany (UZMC); Department of Entomology, University of Copenhagen, Zoological Museums, Denmark (UOPJ); Polish Academy of Science, Museum of the Institute of Entomology, Taipei, Taiwan (UZMC); National Taiwan University, Department of Plant Pathology and Entomology, Taipei, Taiwan (UOPJ); Muséum national d'histoire naturelle, Paris, France (MNHN); Naturhistorisches Museum Wien, Vienna, Austria (NMW); Naturhistoriska Riksmuseet, Stockholm, Sweden (NRS); National Taiwan University, Department of Plant Pathology and Entomology, Taipei, Taiwan (NTU); Naturhistorisches Museum Wien, Vienna, Austria (NMW); Natural History Museum, London, England (BMNH); Deutsches Entomologisches Institut, Deutschen Akademie der Wissenschaften zu Berlin, Germany (ZMHU); and Museo Zoologico “La Specola”, Firenze, Italy (MZLS); Naturhistorisches Museum Wien, Vienna, Austria (NMW); Naturhistoriska Riksmuseet, Sektionen fur entomologi, Stockholm, Sweden (NRS); National Taiwan University, Department of Plant Pathology and Entomology, Taipei, Taiwan (NTU); Polish Academy of Science, Museum of the Institute of Zoology, Warsaw, Poland (PAN); Entomological Laboratory, Institute of Zoology, University of Osaka, Osaka, Japan (UOPJ); University of Copenhagen, Zoological Museums, Department of Entomology, Copenhagen, Denmark (UZMC); and Naturhistorisches Museum Wien, Vienna, Austria (NMW).

LIST OF SPECIES IN HNHM

Family Tephritidae Newman, 1834

1a. Acidiella pachypogon (Ito) (Fig. 1A)


Published after 1930 without a description.

Recognition. This species can be readily distinguished from any other Korean tephritids by the following combination of characteristics (Fig. 1A): 1) body almost entirely yellow brown except for dark brown wing pattern and oviscape; 2) with 2 pairs of black orbital and 3 pairs of black frontal setae; and 3) with 3 or more strong dark brown genal setae.


Other material compared (YSUW). SOUTH KOREA: 1♀ (Fig. 1B), Gangwon-do, Wonju-si, Panbu-myeon, Mt. Baegunsan, 21.VI.2005 (H.-Y. Han et al.).

Distribution. Korea, Japan
Remarks. Synonymy of Pogonangelus assimilis with Acidiella pachypogon was first suggested by Han (1992, Ph.D. dissertation; not an available publication for the purposes of zoological nomenclature) and followed by Wang (1998) and later authors.

2a. Campiglossa absinthii (Fabricius), New Korean Record (Fig. 1B)


Musca cinereus Harris 1780: 75. TL: England. Type depository unknown.


Recognition. This is the smallest known Campiglossa species in Korea. It can be readily distinguished from other Korean Campiglossa species by the following combination of characteristics (Fig. 1B): 1) both posterior notopleural and upper anepisternal setae white; 2) legs entirely yellow brown with dark setae and setulae; 3) pterostigma with single hyaline spot; and 4) anal lobe and basal 2/3 of cell dm almost entirely hyaline.

North Korean material examined (HNHM). Yanggang-do: 2♂, Mt. Baekdusan, Samjiyeon Hotel, lake shore, No. 381,

2*2. Campiglossa absinthii (Fabricius), New Korean Record (Fig. 1B)


Musca cinereus Harris 1780: 75. TL: England. Type depository unknown.


Recognition. This is the smallest known Campiglossa species in Korea. It can be readily distinguished from other Korean Campiglossa species by the following combination of characteristics (Fig. 1B): 1) both posterior notopleural and upper anepisternal setae white; 2) legs entirely yellow brown with dark setae and setulae; 3) pterostigma with single hyaline spot; and 4) anal lobe and basal 2/3 of cell dm almost entirely hyaline.

North Korean material examined (HNHM). Yanggang-do: 2♂, Mt. Baekdusan, Samjiyeon Hotel, lake shore, No. 381,
netting in grasses, 18.VII.1977 (Dely & Draskovits); 3 ♂
1 ♀, same except 20.VII.1977; 1 ♀, same except Samjiyeon
Hotel, lake shore; 1 ♂, Mt. Baekdusan, 20.VII.1977 (Draskovits).

Other material compared (YSUW). SOUTH KOREA: 1 ♂
(Fig. 1B), Gangwon-do, Jeongseon-gun, Mt. Mindungsan,
4.VIII.2005, YSUW090915027 (H.-Y. Han et al.).

Distribution. n. and cent. Europe to Siberia; Israel, Iran,
India, Koera, China, Taiwan.

Remarks. Even though this species is newly recorded in
Korean peninsula, it is a relatively common species in South
Korea. Adult flies can be easily collected by sweeping in the
fields where Artemisia plants are prevalent.

1*3. Campiglossa hirayamae (Matsumura) (Fig. 1C)
Campiglossa conformis Zia 1937: 197. TL: China, Jiangsu,
Zi-Ka-Wei. Holotype ♀ (IZAS).
Campiglossa hensanica Zia 1939: 9. TL: China, Hunan,
Nanyoh [Nanyoe]. Holotype ♀ (IZAS).

Recognition. This species is readily distinguished by the fol-
lowing combination of characteristics (Fig. 1C): 1) heavily

Fig. 1. A, Acidiella pachypogon (Ito), female; B, Campiglossa absinthii (Fabricius), male; C, Campiglossa hirayamae (Matsumura),
female; D, Campiglossa loewiana (Hendel), North Korean male; E, ditto, European male; F, ditto, North Korean female.
grey pollinose scutum and scutellum with round dark brown markings at the bases of acrostichal, dorsocentral, and basal scutellar setae; 2) femora largely dark brown; 3) both posterior notopleural and upper anepisternal setae black; 4) pterostigma with 2 hyaline spots; and 5) anterior half of anal lobe with distinct dark brown markings.


**Other material compared (YSUW).** SOUTH KOREA: 1♀ (Fig. 1C), Gyeongangbuk-do, Bonghwa-gun, Myeonghoneyeon, Mt. Cheongnyangsan, 30.VI.2007 (H.-Y. Han et al.).

**Distribution.** e. Russia, Mongolia, China, Korea, Japan, Taiwan.

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**1. Campiglossa loewiana (Hendel), New Korean Record (Fig. 1D-F)**


**Recognition.** This species can be distinguished from other Korean *Campiglossa* species by the combination of the following characteristics (Fig. 1D-F): 1) posterior notopleural seta white but upper anepisternal seta black; 2) femora largely yellow brown but with some dark brown areas basally; and 3) pterostigma with single hyaline spot. This species superficially resembles *C. defasciata* (≡ *C. frolica*), but can be distinguished from the above character 2.


**Other material compared (YSUW).** SWITZERLAND: 1♀ (Fig. 2E), GR 1490 m, Valbella/Casoja, 26.VII.1999 (B. Merz).

**Distribution.** British Is. and Scandinavia S to France, Albania and Ukraine, E to Mongolia, China, e. Russia and Korea.

**Remarks.** The North Korean specimens of this species are almost identical to the European specimens collected near the type locality (Fig. 1D, F vs. E) except that the Korean specimens have less extensive dark markings on femora. Nevertheless we believe it is within the range of normal infra-specific variation in such a widely distributed species. No South Korean specimens of this species have been discovered yet.

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**2. Sphaeniscus atilis (Walker) (Fig. 2A)**


**Recognition.** This species can be readily distinguished from any other tephritid species in Korea by the combination of the following characteristics (Fig. 2A): 1) body almost entirely dark brown except some areas on head and legs; 2) with 2 pairs of orbital and 2 pairs of frontal setae; and 3) wing with basal hyaline area clearly defined by almost perpendicular base of discal band from basal 2/3 of cell c.


**Other material compared (YSUW).** SOUTH KOREA: 1♀ (Fig. 2A), Gangwon-do, Wonju-si, Heungseon-ri, Hoechon, 21.VII.1997, YSUW018100125 (H.-W. Byun & D.-S. Choi).

**Distribution.** India to e. Russia, Korea and Japan, SE to Australasian and Oceanian Region.

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**3. Tephritis brachyura Loew, New Korean Record (Fig. 2B)**

Recognition. This species can be distinguished from other *Tephritis* by the combination of the following characteristics (modified from Wang (1998)): 1) femora almost entirely yellowish brown; 2) oviscape about as long as abdominal tergite 6; and 3) wing usually with 4-5 isolated hyaline spots in cell m.


Distribution. Ukraine and s. Russia to Kirghizia, Iran, Korea, China.

Remarks. Only a single male specimen in poor condition was available (Fig. 2B), but its identity appears to be clear based on the diagnostic characters and photographs given by Wang (1998).

1*7. *Tephritis sinensis* (Hendel), New Korean Record (Fig. 2C)


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Recognition. This species can be distinguished by any other Korean Tephritis by having the pterostigma with hyaline triangular basal spot (Fig. 2C).


Other material compared (YSUW). SOUTH KOREA: 1♂ (Fig. 2C), Gangwon-do, Wonju-si, Heungeop-myeon, Maejeiri, Yonsei Univ. Campus, col. 22.X.2001, em 16.V.2002, ex Chrysanthemum zawadskii, flower, YSUW090915049 (H.-Y. Han et al.).

Distribution. Korea, China, Japan.

Remarks. Even though this species is newly recorded for the Korean fauna, it is actually a common species that can be easily reared from the flower heads of Chrysanthemum boreale Makino in South Korea (Han, personal data).

18. Trupanea amoena (Faurzenfeld) (Fig. 2D)

Trupanea amoena Faurzenfeld 1857: 542. TL: Croatia, Dalmatien [Dalmatia], Zara [Zadar]; & unstated locality [probably Germany or Austria. Vienna area]. Syntype ♂ (NMW).


Recognition. This species can be readily distinguished from the other known congeners in Korea and surrounding areas by the following wing characteristics (Fig. 2D): 1) two brown bands to margin through cell m; 2) with narrow brown band extends from pterostigma to subapical area of cell br; and 3) apices of cells r2+3 and r4+5 from narrowly triangular hyaline area.


Distribution. widesp. s. Palearctic Region, Ethiopia, India, Sri Lanka, Australia.

Other material compared (YSUW). SOUTH KOREA: 1♂ (Fig. 2D), Jeju-do, Jocheon-eup, Namjoro resting area, 19.X.2005, YSUW090915105 (H.-Y. Han et al.).

Remarks. This species is relatively rarely collected in South Korea.

30. Rivellia alini Enderlein (Fig. 3A)


Recognition. This species is very similar to R. mandschurica but can be distinguished by the following characteristics (Byun et al., 1998) (Fig. 3A): 1) apical parts of cell sc hyaline; 2) preabdominal tergites subshiny and densely rugose; and 3) terminal filaments of aedeagal glans twice as long as basal portion.


Other material compared (YSUW). SOUTH KOREA: 1♀ (Fig. 3A), Gangwon-do, Jeongseon-gun, Mt. Mindungsan, 14.VI.2004 (H.-Y. Han et al.).

Distribution. China (Manchuria), Russian Far East, Korea, Japan.

1*상추과실파리 (개칭). 2*광택방패과실파리 (신칭). 3*알린종령박혀파리

11. *Rivellia apicalis* Hendel (Fig. 3B)


Holotype ♂ (NRS).

**Recognition.** This species can be readily distinguished by any other Korean *Rivellia* by its almost hyaline wing with a dark anterior apical spot (Fig. 3B).


**Other material compared** (YSUW). SOUTH KOREA: 1 ♀ (Fig. 3B), Jeju-do, Jeju-si, grassland in and around Jeolmul recreational foreset, 26.VIII.2003 (H.-Y. Han et al.).

**Distribution.** China, Korea, Japan

12. *Rivellia asiatica* Hennig (Fig. 3C)


Syntype ♂ ♀ (DEI).

**Recognition.** This species can be distinguished from any other Korean *Rivellia* by the short subbasal wing band fused with basal band on cells bc and c (Byun and Han, 2004) (Fig. 3C).


**Other material compared** (YSUW). SOUTH KOREA: 1 ♀ (Fig. 3C), Gangwon-do, Jeongseon-gun, Mt. Mindungsan, 16.VII.2005 (H.-Y. Han et al.).

**Distribution.** Northeastern China, Siberia, Korea.

**Remarks.** This is a very rare species in South Korea but probably the most common *Rivellia* species in Russian Far East near North Korean border (Han, personal observation). Therefore it appears to be more northward distributed species in Korea.

13. *Rivellia longialata* Byun and Suh (Fig. 3D)

Recognition. This species is similar to R. parilis Frey in body color and wing pattern, but can be distinguished by the following characteristics (Byun et al., 1998) (Fig. 3D): 1) legs entirely dark brown except yellow brown fore femur and midtarsi; 2) wing with basal and apical bands separated; and 3) apex of surstylus extends beyond the apex of cerci in lateral view.


Other material compared (YSUW). SOUTH KOREA: 1♀ (Fig. 3D), Gangwon-do, Wonju-si, Maeji-ri, Yonsei University Campus, 12.VI.1996 (H.-W. Byun).


14. Rivellia nigroapicalis Byun and Suh (Fig. 3E)

Rivellia nigroapicalis Byun and Suh in Byun et al., 2001: 108. TL: Korea, Gangwon-do, Yonsei University, Maeji-ri, Wonju-si. HT ♂ (YSUW).

Recognition. This species is similar to R. cestoventris Byun and Suh in wing pattern, but distinguished by the following characteristics (Byun et al., 2001) (Fig. 3E): 1) scutum with dorsocentral seta; and 2) without distinctive postgenal seta.

North Korean material examined (HNHM). Gangwon-do: 1♀, Mt. Geumgangsan, 10.VI.1977 (Draskovits).

Other material compared (YSUW). SOUTH KOREA: 1♀ (Fig. 3E), Gangwon-do, Jeongseon-gun, Mt. Mindungsan, 16.VII.2005 (H.-Y. Han et al.).


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