

New Record of a dark-winged fungus gnat, *Sciaria thoracica* Matsumura, (Diptera: Sciaridae) from Korea

Taeman Han¹, Soojeong An², Seung-Hyun Kim¹, In Gyun Park¹, and Haechul Park^{1*}

¹Applied Entomology Division, National Institute of Agricultural Science, RDA, Nongshaengmyeong-ro 166, Iseo-myeon, Wanju-gun, Jeollabuk-do, 55365, Republic of Korea

²Erang Bio-Enironment Research System, Gangdugaraet-gil 55-6, Gunbuk-myeon, Haman-gun, Gyeongsangnam-do, 52060, Republic of Korea

Abstract

Sciaria thoracica Matsumura belonging to the family Sciaridae is recorded from Korea for the first time. This species is a conspicuous species having the rufous thorax in Palearctic region. The morphological diagnosis and photos of adult, and the result of DNA barcoding inferred from the Korean and the Japanese populations of *S. thoracica* are provided.

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Int. J. Indust. Entomol. 33(2), 68-71 (2016)

Received : 7 Oct 2016

Accepted : 4 Nov 2016

Keywords:

Diptera,
Sciaridae,
Sciaria thoracica,
new record,
Korea.

Introduction

The family Sciaridae (as called dark-winged fungus gnat) is a taxonomically small group, comprising approximately over 2,000 species in the world (Mohring and Menzel, 2009). Their larvae are generally phytosaprophagous in soil humus or zylophagous in rotten wood, but some groups of the family are including serious pests whose larvae feed on live tissue of plants or mushrooms (Menzel *et al.*, 2003).

In Korea, the members of this family were known 10 species belonging to six genera, *Bradysia* Winnertz, *Phytosciara* Frey, *Scatopsciara* Edwards, *Leptosciarella* Tuomikoski, *Lycoreilla* Frey, and *Xylosciara* Tuomikoski (Kim, 2013). Among them, eight species were recently recorded in the Korean fauna (Shin *et al.*, 2012; Mohring *et al.*, 2012). Shin *et al.* (2013) published a molecular phylogenetic study on the family Sciaridae including each

specimen of 63 Korean sciarid species. However, 53 species of which are still not taxonomically recorded in Korea.

We collected a conspicuous species, having the rufous thorax, belonging to the genus *Sciaria* Meigen at three localities in Jeollabuck-do, Korea. In fact, this interesting species was initially known based on a material collected at Chungju city in 2006 through an internet blog (e.g., <http://cafe.naver.com/lovessym/52314>). The second author identified this species as an unrecorded species, *Sciaria thoracica*. And then, distributional range of this species has been known to be expanding to almost of South Korea, except Jeju Island, until now through many internet blogs. However, this unrecorded species is still not documented in taxonomy. Therefore, we herein report this species based on morphological diagnosis and DNA barcoding profile compared with congeners.

*Corresponding author.

Haechul Park

Applied Entomology Division, National Institute of Agricultural Science, RDA, Nongsaengmyeong-ro 166, Iseo-myeon, Wanju-gun, Jeollabuk-do, 55365, Republic of Korea

Tel: +82-63-238-2938 / FAX: +82-63-238-3833

E-mail: culent@korea.kr

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Materials and Methods

We collected six Korean specimens of *Sciaria thoracica* at Wanju, Gimje, and Jinan, Jollabuk-do, Korea. We complied with the methods for morphological examination of specimens and analyses of DNA barcoding represented in Han *et al.* (2013). To reconfirm species status by molecular species identification, we extracted 27 *COI* sequences of seven *Sciara* spp., including the Japanese *S. thoracica*, from GenBank (<https://ncbi.nlm.nih.gov>) (Sutou *et al.*, 2011; Shin *et al.*, 2013; Telfer *et al.*, 2015). Among them two sequences of *Corynoptera furcifera* and *Leptosciarella* sp. 3 were used as outgroup taxa. Six *COI* sequences of the Korean *S. thoracica* are available from GenBank under accession numbers KX950763-KX950768.

Results

Taxonomic account

Family Sciaridae Billberg, 1820검정날개버섯파리과

Subfamily Sciarinae Billberg, 1820

Genus *Sciara* Meigen, 1803

Sciara Meigen, 1803: 263. Type species: *Tipula thomae* Linnaeus, 1767 [as "*Hirtea thomae* Fabricius"], by monotypy [= *Tipula hemerobioides* Scopoli, 1763].

Synonyms: see Mohring *et al.*, 2013: 246.

Diagnosis: Basal part of 4th flagellomere normal, without basal neck; wing membrane and wing veins usually with macrotrichia or rarely bare; apex of fore tibia not margined or incompletely margined, with bristle-like structure; gonostylus of hypopygium usually wider than long, with apical spines and well developed lobe structure at inner side.

Distribution: Holarctic region (Menzel and Horing, 2000)

Species *Sciara thoracica* Matsumura, 1916

주홍가슴검정날개버섯파리과(신칭)

Sciara thoracica: Matsumura, 1916: 436 (Type locality: Sapporo, Hokkaido, Japan); Menzel and Hohring, 2000: 526; Sutou *et al.*, 2004: 177.

Diagnosis: Throat wholly orange brown in both sexes; scutellum with dark brownish setae of various lengths; legs with orange brown in coxae and femora, brown in throchanters and



Fig. 1. A male of *Sciaria thoracica* in the lateral view.

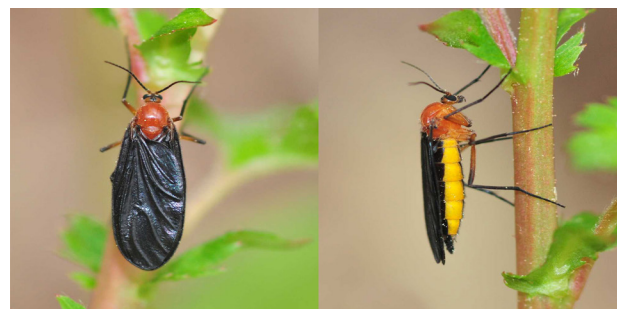


Fig. 2. A female adult of *Sciaria thoracica* at Mt. Unjangsan, Jinan-gun, Jeollabuk-do, Korea.



Fig. 3. Male genitalia (hypopygium) of the Korean *Sciaria thoracica*.

tibiae, dark brown in tarsi; wing infusate, wing membrane with macrotrichia; posteriorpronotum with setae; tergites and sternites dark brown or black in male (Fig. 1), but lateral sides of stenites orange brown in female (Fig. 2); gonocoxite (Fig. 3) stout and rounded, dorsal surface deeply concave, not reaches basal half, inner side of gonocoxite simple, without long setae; gonostylus rectangular, slightly curved inward at apical part with numerous short conical setae, 6–8 apical spines located ventroapically; tegmen rounded at apex, longer than wide, with minute denticles

on central part; aedeagus short and stout; paramere sclerotized with three distinct processes.

Specimen examined: 1 male and 2 females, Gimje, Jeollabuk-do, Korea. 20. V. 2016. Haechul Park (DNA nos. 17824–17826); 1 male and 1 female, Mt. Unjaing, Jinan, Jeollabuk-do, Korea. 12. V. 2016. Taeman Han (DNA nos. 17402–17403); 1 female, Wanju, Jeollabuk-do, Korea. 26. IV. 2016. Haechul Park (DNA no. 17314).

Distribution: Korea (new record) and Japan.

Biology: This species was suggested as a univoltine (Sutou *et al.*, 2004). Adults are usually observed from April to May in southern part, and Jun in Gangwon province, Korea. The other biological information such as other stages, habitat, and feeding habit is not unknown in Korea.

Remarks: In the genus *Sciara*, four species are known to have a rufous thorax: *S. thoracica* from Korea and Japan; *S. copiosa* Lengersdorf and *S. rufithorax* van der Wulp from the Oriental region; *S. differens* (Lengersdorf) from Congo. *S. thoracica* can be easily distinguished from *S. copiosa* and *S. rufithorax* by different genital structures, and separated from *S. differens* lacking macrotrichia on the wing membrane (Sutou *et al.*, 2004). Taxonomically, *S. thoracica* is belonging to *S. hemerobioides* species group characterized by the inner side of the gonocoxite without long setae, the concavity of the dorsal surface of the gonocoxite deep, but does not reach basal half (Menzel and Mohring, 2000).

DNA barcode profile

NJ tree (Fig. 4) for 31 *COI* sequences of seven ingroup taxa of

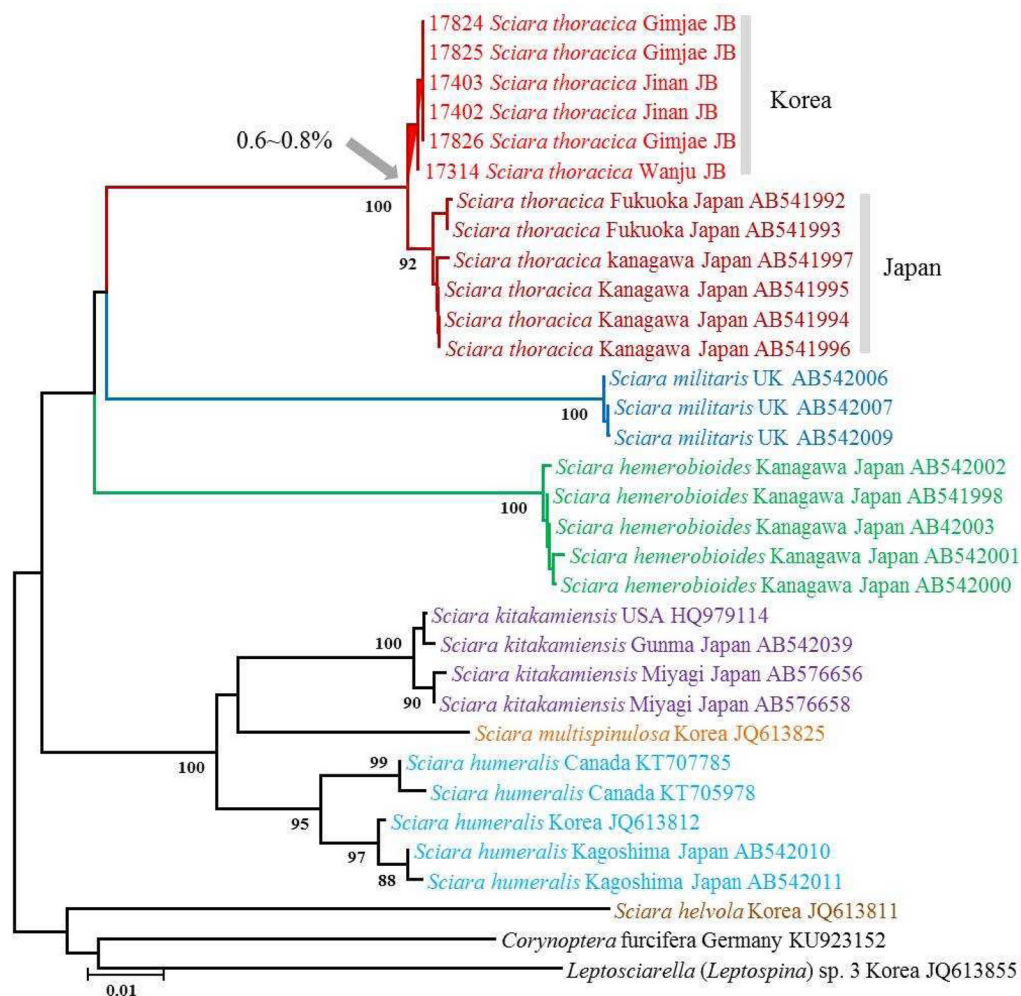


Fig. 4. Neighbor-joining tree inferred from *COI* partial sequence of *Sciara* spp. Numbers under each node are bootstrap values.

Sciana showed that each species was separated as reciprocally distinct clade with moderate to large interspecific genetic distance (range 4.7%–15.6%). It indicates that each morphospecies are well defined to independent specific status. Especially, *S. thoracica* showed that the minimum interspecific distance was 8.4% compared with other species in our data. The intraspecific distance between the Korean and the Japanese populations was detected to be ranged from 0.6% to 0.8%, but it is considered as the same species in *COI* gene analysis.

Acknowledgments

This study was carried out with the support of “Research Program for Agricultural Science & Technology Development (Project No. PJ01005102)”, national Institute of Agricultural Science, Rural Development Administration, Republic of Korea.

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