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Original Article

Two new records of the orthotyline plant bug (Hemiptera: Heteroptera: Miridae) from the Korean Peninsula

Junggon Kim, Sunghoon Jung*

Laboratory of Systematic Entomology, Department of Applied Biology, College of Agriculture and Life Sciences, Chungnam National University, Daejeon, South Korea

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ABSTRACT

Two new records of the subfamily Orthotylinae (Heteroptera: Miridae: Orthotylinae), *Zanchius tarasovi* Kerzhner, 1988 and *Orthotylus bilineatus* (Fallén, 1807), are reported for the first time to the Korean fauna. The genus *Zanchius* is also first recorded from the Korean Peninsula. Redescriptions of genitalia, diagnoses of each species and genus, and biological notes are presented with the photographs and illustrations.

Introduction

The subfamily Orthotylinae is the third largest group in the family Miridae (Insecta: Hemiptera: Heteroptera) in the world (Schuh and Slater 1995), and is one of the remarkable groups economically because it contains insect pest groups and predator groups (Schaefer and Panizzi 2000). Among them, some species of the predatory groups have been developed and used as biological control agents, such as *Cyrtorhinus fulvus* (Wheeler 2000).

In this paper, two orthotyline species are newly reported from the Korean Peninsula, *Zanchius tarasovi* Kerzhner, 1988 and *Orthotylus bilineatus* (Fallén, 1807). Regarding *Z. tarasovi*, its higher taxa, genus *Zanchius*, is also reported for the first time. Morphological information including diagnoses and descriptions of male genital structures, and biological notes are provided along with photographs and illustrations.

Materials and methods

Photographs of dorsal habitus and genitalia were taken by a Leica DMC 2900 camera combined with a Leica M165C microscope. Measurements were taken using a software program equipped with the same microscope. All measurements are given in millimeters. To observe male genital structures, the genital segment was detached and then boiled in 10% KOH solution at 70°C for 3–5 minutes until it was transparent. After placing in distilled water, it was dissected to examine endosoma and parameres. Terminology mainly follows Yasunaga (1999). The depository of examined specimens is Laboratory of Systematic Entomology, Chungnam National University (CNU), Daejeon, Korea. Host with an asterisk means it is a new record.

Taxonomic accounts

Genus *Zanchius* Distant, 1904 연초록들장님노린재속 (신칭)

Zanchius Distant, 1904: 477. Type species: *Zanchius annulatus* Distant, 1904.

Zonodorus Distant, 1909: 522 (synonymized by Carvalho, 1952: 79). Type species: *Zonodorus gubernator* Distant, 1909.

Uzeliella Poppius, 1911: 31 (junior homonym of *Uzeliella* Bagnal, 1908, Thysanoptera) (synonymized by Carvalho, 1952: 79). Type species: *Uzeliella flavovirens* Poppius, 1911.

Poppiella Bergroth, 1911: 188. New name for *Uzeliella* Poppius, 1911.

Habrocoris Wagner, 1951: 153 (synonymized by Linnavuori, 1964: 329). Type species: *Habrocoris breviceps* Wagner, 1951.

Diagnosis. Recognized by body generally green coloration and elongated oval; frons anteriorly projected; compound eye not

* Corresponding author. Tel.: +82 42 821 5767; fax: +82 42 823 8679.
E-mail address: jung@cnu.ac.kr (S. Jung).

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touching anterior margin of pronotum; antennae with reddish or dark markings; lateral margin of hemelytron rounded; legs without patterns (Figures 1A–C); endosoma membranous with sclerites (Figure 2D).

***Zanchius tarasovi* Kerzhner, 1988** 연초록들장님노린재 (신칭)
(Figures 1A, 1C, 2, 3A–C)
Zanchius tarasovi Kerzhner, 1988: 49; Yasunaga, 1999: 167; Lin, 2005: 191.

Diagnosis. Recognized by head with reddish marking behind compound eyes; first antennal segment with reddish stripe laterally (Figure 1C); scutellum usually with reddish marking in middle; apex of clavus with reddish marking; inner part of corium usually with reddish marking, reddish marking sometimes individual variation in size (Figure 1A); sclerite I broad with approximately eight teeth (Figures 2D and 2E).

Description. See Kerzhner (1988) and Yasunaga (1999) for original and detailed description, respectively.

Male genitalia. Left paramere scythe shaped with sharp hypophysis and some sparse setae (Figure 2A); right paramere slightly curved, with distinct project medially (Figures 2B and 2C); endosoma membranous with three sclerites, sclerite I broad with approximately eight teeth, sclerite II somewhat shin and tapered at apex, sclerite III thicker than sclerite II and curved (Figures 2D and 2E).

Measurements (in mm). Male ($n = 2$)/female ($n = 1$) body length, tylus–apex of membrane: 4.48–4.59/5.01; head length, excluding collar: 0.30–0.32/0.33; head width, including compound eyes: 0.77–0.79/0.79; vertex width: 0.32–0.33/0.38; first antennal segment length: 0.42–0.45/0.43; second antennal segment length: 1.90–1.93/2.10; third antennal segment length: 1.08–1.12/missing; fourth antennal segment length: 0.68–0.74/missing; total antennal length: 4.08–4.24/2.53; first rostral segment length: 0.30–0.32/0.36; second rostral segment length: 0.34–0.36/0.36; third rostral segment length: 0.39–0.43/0.40; fourth rostral segment length: 0.35–0.37/0.41; total rostral length: 1.38–1.48/1.53; mesal pronotal length: 0.47–0.49/0.62; basal pronotal maximal width (straight): 1.16–1.17/1.24; anterior scutellumal width: 0.75–0.78/0.78; mesal scutellumal length: 0.92–0.94/0.93; outer embolial margin length (straight): 2.39–2.47/2.60; outer cuneal margin length (straight): 0.72–0.76/0.84; maximal width across hemelytron: 0.79–0.85/0.93; foreleg (femur:tibia:tarsus): 0.96–1.00:1.20–1.32:0.33–0.35/1.22:1.48:0.35; midleg (femur:tibia:tarsus): 1.10–1.14:1.31–1.42:0.33–0.37/1.29:1.61:0.37; hindleg (femur:tibia:tarsus): 1.67–1.73:2.47–2.51:0.41–0.42/1.78:2.85:0.48.

Specimen examined. [CNU] 1♂, Gung-dong, Yuseong-gu, Daejeon, Korea, 16 ix 2014, by Light trap (JG Kim); 1♂,1♀, Saeun-ri, Chilseong-myeon, Goesan-gun, Chungcheongbuk-do, Korea, 6 viii 2015, by Light trap (JG Kim); [CNU] 2♂♂,1♀, Pocheon-si, Gyeonggi-do, Korea, 9 vii 2016, on *Quercus aliena* (JH Park).

Host. *Juglans ailantifolia* (Juglandaceae), *Tilia japonica* (Tiliaceae), *Quercus crispula* (Fagaceae), *Alnus* spp. (Betulaceae), *Salix* spp. (Salicaceae) (Yasunaga 1999), *Q. aliena* (Fagaceae)*.

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

Biology. This species is reported as a predator for many leafhoppers, especially typhlocybinid leafhopper such as *Limassolla* species on persimmon tree in China and Japan (Zheng and Liang 1991; Zheng and Liu 1993; Yasunaga 1999; Wheeler 2001). This species has been attracted to light trap.

Remarks. Last instar of this species is mostly pale greenish in color. First and second antennal segments are pale brown, with slight reddish tinge at the base and apex (Figure 3C), while those of adult are reddish (Figures 3A and 3B).

Genus *Orthotylus* Fieber, 1858 들장님노린재속
Orthotylus Fieber, 1858: 315. Type species: *Cimex nassatus* Fabricius sensu Fieber, 1858 (=*Orthotylus marginalis* Reuter, 1883).
Litosoma Douglas & Scott, 1865: 334 (synonymized by Puton, 1869: 26). Type species: *Litosoma nassata* sensu Douglas & Scott, 1865 (=*Orthotylus marginalis* Reuter, 1883).
Diommatus Uhler, 1887: 32 (synonymized by Horvath, 1908: 9). Type species: *Diommatus congrex* Uhler, 1887 (=*Lygus dorsalis* Provancher, 1872).

Diagnosis. Recognized by body generally greenish, elongated or elongated oval; compound eye reaching or almost reaching to anterior margin of pronotum; lateral margin of hemelytron straight or slightly rounded; pronotum and hemelytra covered with brown to dark setae, or entirely covered with pale setae; male genitalia with several branch-shaped sclerites.

***Orthotylus bilineatus* (Fallén, 1807)** 검은줄들장님노린재 (신칭)
(Figures 1B, 3D, 4)
Capsus bilineatus Fallén, 1807: 102.
Capsus kirschbaumii Flor, 1860: 465, 614 (synonymized by Douglas & Scott, 1866: 246).
Pseudorthotylus sordidus Poppius, 1914: 66 (synonymized by Linnavuori, 1994: 31).

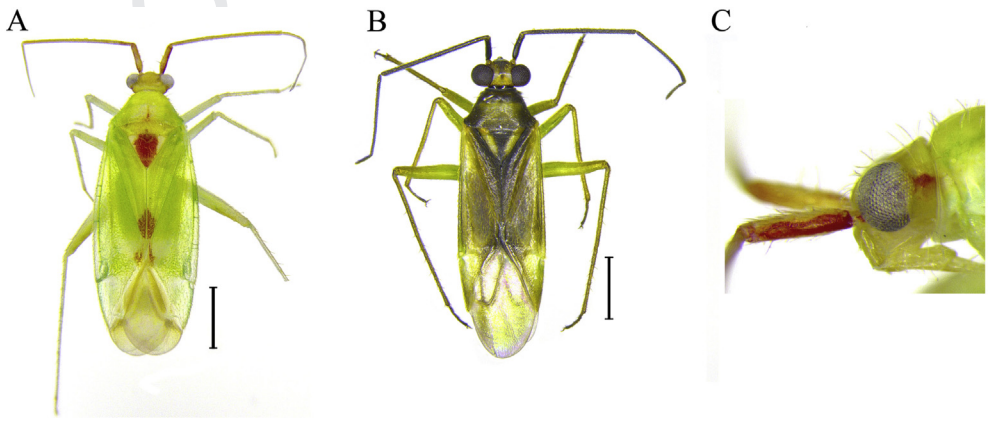

Figure 1. Dorsal habitus and diagnostic character of *Zanchius tarasovi* and *Orthotylus bilineatus*: A, habitus of *Z. tarasovi*; B, ditto, *O. bilineatus*; C, reddish markings of *Z. tarasovi* in lateral view. Scale bar: 1 mm.

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