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A New Record for the Genus *Duplachionaspis* Armored Scale (Hemiptera: Diaspididae) from Korea

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한국산 미기록 *Duplachionaspis*屬의 보고

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ABSTRACT: One species of the *Duplachionaspis*, *D. divergens* (Green, 1899) is newly recorded in the Korean fauna of armored scales (Diaspididae). The characters of this genus and species are here redescribed from Korean specimens. A key to species of *Duplachionaspis* from the East Palaearctic Region, photographs and information on the distribution and hosts of this species, are also provided.

Key words: *Duplachionaspis divergens*, New Record, Diaspididae, Korea

초 록: *Duplachionaspis*屬의 *D. divergens* (Green, 1899) 1종을 국내분포로 처음 보고하고, 동 속과 종의 특징, 동아시아산 *Duplachionaspis*屬의 종 동정에 필요한 검색표, 사진자료, 분포 및 기주 정보를 함께 기재하였다.

검색어: *Duplachionaspis divergens*, 미기록종, 깍지벌레과, 한국

The genus *Duplachionaspis* (Hemiptera: Diaspididae) is comprised of 34 species worldwide with the type-species, *Chionaspis graminis* Green being described from Sri Lanka. The majority of *Duplachionaspis* species are known from the Afrotropical and Palaearctic Regions as 20 species and 12 species respectively. This genus is closely related to *Dentachionaspis*, *Getulaspis*, and other genera where median lobes are not yoked basally. Also species belonging to *Duplachionaspis* usually occur on grasses (Poaceae) although certain species feed on Chenopodiaceae, Cyperaceae, Fabaceae, and Liliaceae etc. (Takagi, 1970; Ben-Dov et al., 2012).

Knowledge of the Korean fauna of the armored scales (Diaspididae) began in 1928 with the publication of Machida and Aoyama (cited from the publication of Paik (2000)); so far, seventy six species have been documented (Paik, 1978; Paik, 2000; Suh and Hodges, 2007; Lee, 2010; Suh, 2011; 2012), but the genus of *Duplachionaspis* has not been documented yet in Korea. At the recent survey (2012) of Jellanamdo, located at the southern area of Korea and predominated by subtropical plants that armored scales prefer, one species of *Duplachionaspis* occurring on Chinese silver grasses (*Miscanthus sinensis*) was collected. It was identified as *Duplachionaspis divergens* (Green) and this species is newly reported from the Republic of Korea.

In this paper, a key to species of *Duplachionaspis* known from the East Palaearctic Region including Korea's neighboring countries and diagnosis, photographs, host plants, and distribution of *D. divergens*, are provided for a correct identification.

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Materials and Methods

All of slide mounted and dried specimens (Fig. 1I) used for this paper are deposited in the Collection of Yeongnam Regional Office, Animal, Plant and Fisheries Quarantine and Inspection Agency in Busan, Korea. While seven species mentioned in the key below were based on the scientific literatures (Takagi, 1970; Chen, 1983; Ben-Dov et al., 2012). The East Palaeartic Region used herein includes Eastern Aisa, China, Japan, Hong Kong, Korea, Mongolia, Taiwan, Maritime Territory (Southern Primor'ye). Terminology for morphological structures used in descriptions and an identification key follows that of Miller and Davidson (2005). Photographs were taken using an AxioCam MRc5 camera through ZEISS Axio Imager M2 Microscope and a Leica M165C microscope with Delta pix camera. An asterisk(*) is used to indicate a new distribution record.

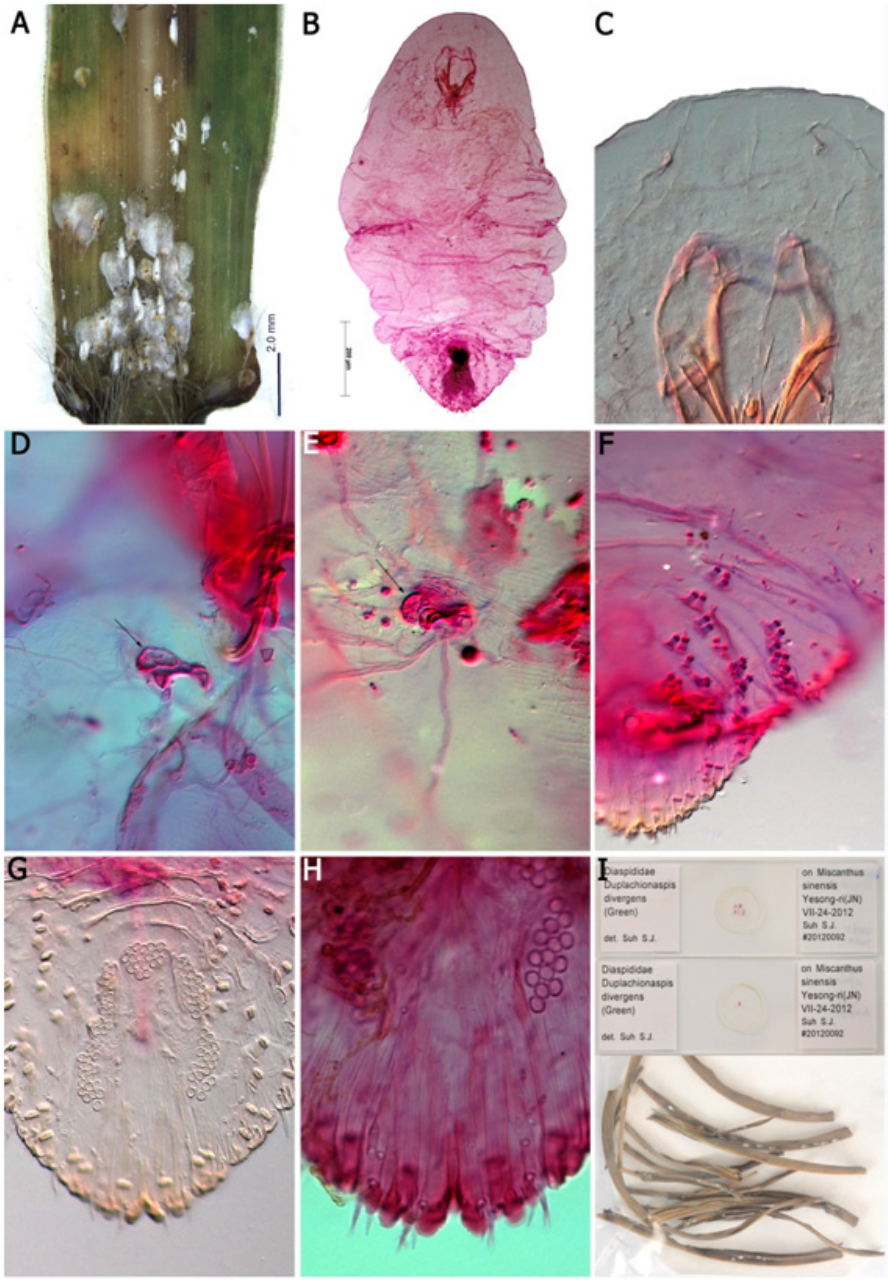

Fig. 1. *Duplachionaspis divergens* (Green); A. habitus, B. female, C. antennae, D. anterior spiracle, E. posterior spiracle, F. abdomen, G. perivulvar pores, H. median lobes, I. specimens.

Results and Discussion

Description

Genus *Duplachionaspis* MacGillivray, 1921 억새잎깍지벌레속(신칭)

Duplachionaspis MacGillivray, 1921: 307. Type species: *Chionaspis graminis* Green.

Diagnosis. *Duplachionaspis* armored scale cover of adult female elongate, oystershell shaped or subcircular. Body oval or elongate, more or less fusiform; cephalothorax not conspicuously expanded, never sclerotized. Median lobes not yoked basally though sometimes with secondary basal sclerotization; second lobes bilobulate. Pygidial gland spines present but absent between median lobes. Dorsal macroducts arranged in segmental series; marginal macroducts conspicuously larger than submedial macroducts or more or less the same size; absent between median lobes. With pores near anterior spiracle, with or without pores near posterior spiracle. Perivulvar pores in five groups. Anal opening more or less in middle of pygidum. First instars wit cephalic margin notched between antennae (Takagi, 1970; Munting, 1977).

Duplachionaspis divergens (Green, 1899) 억새잎깍지벌레(신칭)

Synonymy. *Chionaspis graminis divergens* Green, 1899 [Sri Lanka: on *Andropogon nardus*]. *Chionaspis miscantheae* Kuwana, 1928. *Greenaspis graminis divergens*; Ferris, 1952. *Duplachionaspis miscantheae*; Takagi, 1961. *Greenaspis divergens*; Borchsenius, 1966.

Diagnosis. Field Characters (Fig. 1A): Adult female cover flat, white, broadly oyster-shell shaped; shed skins marginal, yellow to brown. Male cover elongate, white, felted, with 3 faint, longitudinal ridges; shed skins light yellow. Slide-mounted characters (Fig. 1B-H): Adult female with 2 pairs of well-developed lobes, third lobes with lateral lobule represented by series of low points. Median lobes divergent, not yoked basally, with a pair of distinct marginal setae between them; second lobes smaller than median lobes, rounded, shorter than median lobes, bilobed, medial lobule largest, medial and lateral lobules without notches; third lobes with medial lobule wider and shorter than medial lobule of second lobe, lateral lobule represented by series of low points. Gland spine formula 2-2-2(3), with about 12 gland spines near each body margin anterior of fourth lobe area, medial lobes without gland spines between them. Macroducts on pygidium about same size, without duct between medial lobes; submedial ducts on segments 3 to 6, segments 3 to 5 with 2 to 5 ducts each, segment 6 with 2 to 3 ducts; submarginal ducts on segments 3 to 5, segments 3 to 4 with 5 to 10 ducts each, segment 5 with 1 to 5 ducts; marginal ducts on segments 5 to 7 with 1 to 2 ducts each. Dorsal microducts present on submedial and submarginal areas of segments 1 to 3. Ventral microducts scattered on pygidum and on submedial area of head to segment 5. Perivulvar pores in 5 groups; approximately 45 pores on each side of body. Anterior spiracles with 10 to 12 pores, posterior spiracles with 5 to 10. Antennae each with 1 conspicuous seta. Body elongate and mesothorax and metathorax protuberances.

Material examined. Korea. Jeollanamdo: Bogildo (Yesong-ri, Bogil-myeon, Wando-gun), 13 adult females, on *Miscanthus sinensis* Andersson (Poaceae), 24-vii-2012 (S.J. Lee and S.J. Suh).

Hosts. Poaceae: *Agrostis alba*, *Agrostis verticillata*, *Andropogon nardus*, *Andropogon sorghum*, *Andropogon* sp., *Arundo donax*, *Arundo formosana*, *Arundo pliana*, *Bambusa* sp., *Cymbopogon* sp., *Imperata cylindrica*, *Miscanthus sinensis*, *Miscanthus* sp., *Paspalum notatum*, *Paspalum scrobiculatum*, *Saccharum* sp., *Spinifex littoreus*, *Stenatophrum secundatum*, *Zoysia matrella* (Ben-Dov et al., 2012).

Distribution. Australasian: Australia. Nearctic: United States of America. Neotropical: Colombia, Venezuela. Oriental: China, India, Sri Lanka, Taiwan, Thailand. Palaearctic: Algeria, China, Egypt, Japan, *Korea (Ben-Dov et al., 2012).

Biology. It is reported that females lay an average of 130 eggs and that up to 9 generations a year occur with an average generation time of 39 days (Evans and Hodges, 2007).

Economic Importance. This species has been reported as a minor pest of sugarcane in India and Columbia. Sugarcane growers usually implement natural control strategies and seldom use pesticides (Evans and Hodges, 2007). While it has a restricted host range occurring on Poaceae and *Miscanthus sinensis* is not an economic crop in Korea. Also we did not observe this scale to be causing serious damage to the Chinese silver grasses (*M.*

sinensis) during the survey.

Identification tool

The dichotomous key of slide mounted characters is provided to distinguish adult females of *Duplachionaspis* species from the East Palaearctic Region.

Key to species of *Duplachionaspis* from East Palaearctic Region (Slide mounted adult female)

1. Dorsal large macroducts (as large as the marginal macroducts) present on segment 2 of abdomen ····· ***D. subtilis* Borchsenius**

1b. Dorsal large macroducts absent on segment 2 of abdomen ····· 2

2. Dorsal large macroducts present on segments 3 to 5 of abdomen ····· 3

2b. Dorsal large macroducts presnet on segments 3 to 6 of abdomen ····· 4

3. Body elongated oval; cephalothorax width greater than abdomen width. With seven pores or more near posterior spiracles ····· ***D. saccharjolii* (Zehntner)**

3b. Body oval; cephalothorax width not greater than abdomen width. Without pores near posterior spiracles ····· ***D. oblonga* Chen**

4. First space, second space, and third space with two gland spines ····· ***D. divergens* (Green)**

4b. First space, second space, and third space with one gland spine ····· 5

5. Dorsal small macroducts present on segments 2 to 3 of abdomen ····· ***D. natalensis* (Maskell)**

5b. Dorsal small macroducts absent on segments 2 to 3 of abdomen ····· 6

6. Length of median lobes equal to length of adjacent marginal duct ····· ***D. rotundata* Chen**

6b. Length of median lobes longer than length of adjacent marginal duct ····· ***D. fujianensis* Chen**

Discussion

Duplachionaspis divergens (Green) is added in Korean armored scale fauna through the recent survey conducted in Jellanamdo. This species resembles the genera *Chionaspis* and *Pseudaulacaspis* have already known in Korea; however, it is easily diagnosed by its divergent median lobes. Also additional information provided in this paper should be helpful to understand the genus *Duplachionaspis* and related species of this genus.

While writing a key to species of *Duplachionaspis*, we found that there is only the minor difference between *D. rotundata* and *D. fugianensis* recorded from China by Chen (1983) and also their descriptions did not match figures provided in his paper; the minor difference has been mentioned in the Key above. Two species are considered to be the same species based on the descriptions and illustrations although we did not examine specimens of type species (Wu, S.A., personal communication). Then further study for these species is needed.

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We would like to thank Dr. Greg Hodges (Nematology and Plant Pathology Division of Plant Industry/FDACS, USA) for his useful editorial contributions to this manuscript. We also thank Dr. Sadao Takagi (Hokkaido University, Japan) for providing a reference specimen of *D. divergens*.

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