

[研究文章 Research Article]

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First Report of Pronotal Black Mark Difference of *Cyrtotrachelus thompsoni* Alonso-Zarazaga & Lyal, 1999 (Coleoptera: Curculionidae) between Taiwan and Matsu Islands, with Key to Species of the Palearctic Region

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Abstract. *Cyrtotrachelus thompsoni* Alonso-Zarazaga & Lyal, 1999 is a common species widely distributed in Asia, including China, Japan and Taiwan from East Asia; India and Pakistan from South Asia. In this study, we provided the first report of the pronotum phenotype difference of *C. thompsoni* between Matsu islands and Taiwan island. The photograph of habitus, illustration of male genitalia and key to Palearctic species of *Cyrtotrachelus* are also provided.

Key word: Curculionidae, Dryophthorinae, Rhynchophorini, *Cyrtotrachelus thompsoni*, Matsu islands, phenotype difference

Introduction

The subfamily Dryophthorinae Schoenherr, 1825 is a large subfamily of Curculionidae, including 152 genera and approximate 1500 species worldwide. Most of the dryophthorinids are highly abundant and diverse in tropical and subtropical region (Alonso-Zarazaga & Lyal, 1999; Anderson & Marvaldi, 2014). The adults are characterized by the antennae inserted near the base of pronotum and antennal club with basal part glabrous and apical part pilose (Anderson, 2002). Dryophthorinids are known to develop in the root or stem of monocotyledonous angiosperms and some species have been considered serious agricultural pests (Oberprieler et al., 2007; Anderson & Marvaldi, 2014).

The bamboo shoot weevil, *Cyrtotrachelus thompsoni* Alonso-Zarazaga & Lyal, 1999, belonging to the tribe Rhynchophorini, is widely distributed in South and East Asia, including Pakistan, India, China, Japan and Taiwan (Alonso-Zarazaga et al., 2017). The life cycle of *C. thompsoni* is highly associated with bamboos, especially the larva developed in the bamboo shoot. Owing to the bamboo shoots are important crops in Asia, this species has been identified as significant agricultural pest.

In the faunistic survey of the weevil in Matsu islands, we discovered a different form of the black mark on the pronotal base in *C. thompsoni*. It is phenotypic difference between Taiwan island and Matsu islands. The black mark form of Taiwanese population usually has a distinct angle on the upper margin. Whereas, the specimens from Matsu islands majorly have a flat or slightly emarginated upper margin, which is more similar with the specimens from China. After the examination of the specimens and pictures of *C. thompsoni* from Taiwan island, Matsu islands and China, we further confirm at least two phenotypes between the Taiwan Strait. In this study, we provide the first report of the pronotal phenotypic variation in *C. thompsoni*. Furthermore, for the species identification, we provide the key to Palearctic *Cyrtotrachelus* species and illustration of male genitalia.

Material and methods

The specimens were examined by Microtech MX201 stereomicroscope. The photograph was taken by the digital camera Olympus OM-D E-M1 with Olympus M. ZUIKO DIGITAL ED 30mm F3.5 Macro lens and edited by Helicon focus 6. Specimens examined in this study include the collections of the National Museum of Natural Science, Taichung, Taiwan (NMNS) and B.-H. Ho's private collection, Taipei, Taiwan (BHPC). The key to Palearctic *Cyrtotrachelus* modified after Heller (1923).

Results

Cyrtotrachelus thompsoni Alonso-Zarazaga & Lyal, 1999

Chinese name: 臺灣大象鼻蟲、筍龜、竹直錐大象

Cyrtotrachelus thompsoni Alonso-Zarazaga & Lyal, 1999

Curculio longimanus Fabricius, 1775

Curculio longipes Fabricius, 1781

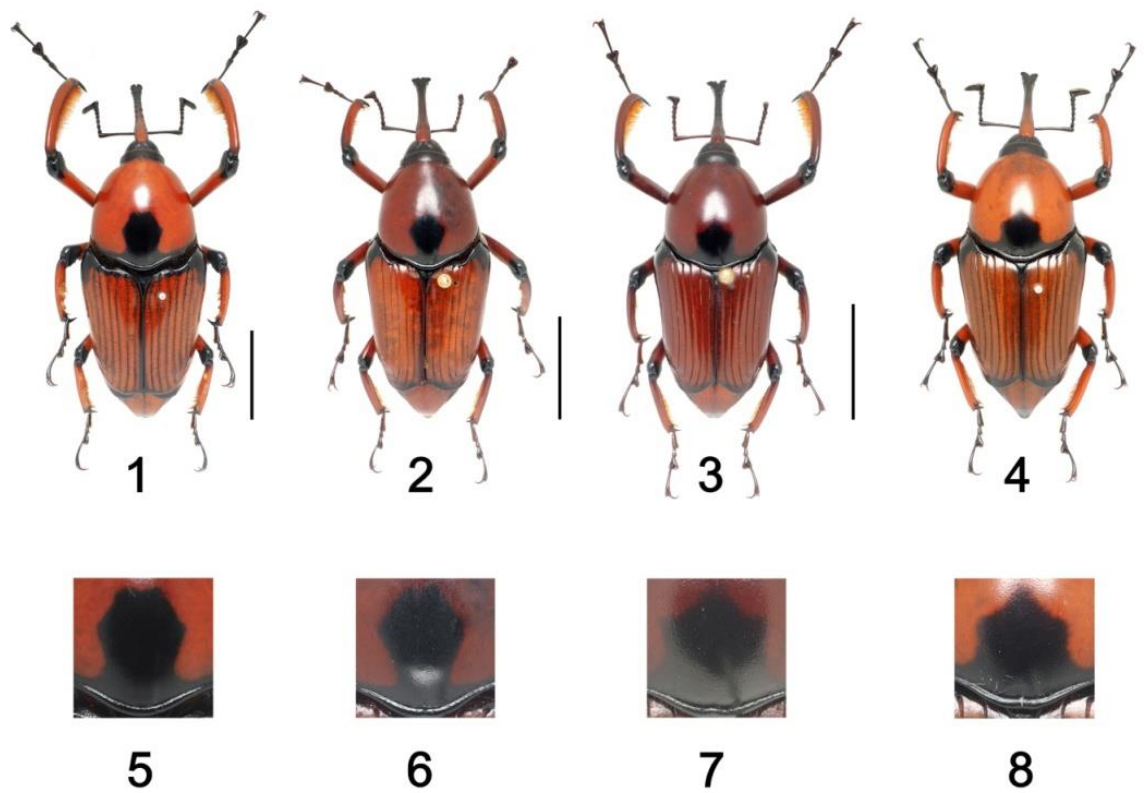
Material examined. 1♀, TAIWAN: Taoyuan County, Xinpo (新坡), Guanyin Township, 5. VII. 1969, B.-S. Chang leg. // NMNS ENT 1282-33509 (NMNS); 1♂, TAIWAN: Taoyuan County, Yangmei (楊梅), Yangmei Township, 22. VI. 1972, B.-S. Chang leg. // NMNS ENT 1282-33476 (NMNS); 1♀, TAIWAN: Taoyuan County, Fusing (復興), Fusing Township, 26. VI. 1972, H.-L. Juang leg. // NMNS ENT 1282-33753 (NMNS); 2♀♀, TAIWAN: Taoyuan County, Yangmei (楊梅), Yangmei Township, 6. VII. 1972, B.-S. Chang leg. // NMNS ENT 1282-33473; 1282-33476 (NMNS); 3♂♂, TAIWAN: Taipei County, Jinshan (金山), Jinshan Township, 17. VII. 1984, I.-S. Hsu leg. // NMNS ENT 7932-572; 7932-598; 7932-599 (NMNS); 1♂, TAIWAN: Taipei City, Pingdenli (平等里), Beitou District, 9. VIII. 1986, I.-S. Hsu leg. // NMNS ENT 7932-594 (NMNS); 1♀, TAIWAN: Taichung County, Shigang dam (石岡水壩), Shigang Township, 7. IX. 1986, I.-S. Hsu leg. // NMNS ENT 7932-600 (NMNS); 1♂1♀, TAIWAN: Taipei City, Zhuzihhu (竹子湖), Beitou District, 15. VI. 1987, J.-I. Gao leg. (NMNS); 1♀, TAIWAN: Taipei County, Jixinjian (雞心尖), Pingsi Township, 5. X. 1992, I.-S. Hsu leg. // NMNS ENT 7932-595 (NMNS); 1♂, TAIWAN: Taipei County, Beixinzhuang (北新庄), Sanzhi Township, 25. VI. 1993, I.-S. Hsu leg. // NMNS ENT 7932-597 (NMNS); 1♂, TAIWAN: Taipei City, Zhuzihhu (竹子湖), Beitou District, 30. IX. 1997, J.-I. Gao leg. (NMNS); 2♂♂, TAIWAN: Taipei City, Yangmingshan (陽明山), Beitou District, 24. VIII. 1999, J.-C. Yang leg. (NMNS); 1♀, TAIWAN: Taipei City, Gezhi junior high school (格致國中), Shilin District, 23. VII. 1999, M.-Z. Jiang leg. (NMNS); 1♀, CHINA: Fujian Province, Nanping (南平), Wuyishan City, 14. VIII. 2002 – 28. VIII. 2002, C.-S. Lin leg. // NMNS ENT 3911-79 (NMNS); 1♀, TAIWAN: Taipei City, Jingshan (菁山), Shilin District, 26. IV. 2007, R.-M. Zhu & K.-L. Li leg. (NMNS); 1♀, TAIWAN: Taipei City, Mt. Xiangtian (向天山), Beitou District, 13. VIII. 2014, B.-H. Ho leg. (BHPC); 1♂, TAIWAN: Lienchiang County (Matsu Islands), Fuwo Village (福沃村), Nangan Township, 22. VII. 2016, L.-C. Chen leg. (BHPC).

Diagnosis (modified after Heller (1923)). Pronotal base with black mark, in length not reaching the middle part of pronotum (black mark in longitudinal form extending over the middle part in *C. rufopectinipes*); striae VII-X weakly sulcate than striae I-V (striae VII-X denser and coarser in *C. bipartitus* and *C. himalayanus*); sternites I-V with distinct setae medially and laterally (absent in *C. buquetii*); front legs shorter than body length in males (longer than body length in *C. buquetii*).

Distribution. India, Pakistan, Japan, China (Shaanxi, Henan, Jiangsu, Sichuan, Hubei, Guizhou, Hunan, Jiangxi, Zhejiang, Fujian, Yunnan, Guangxi and Guangdong), Taiwan (Taiwan island and Matsu islands).

Key to the species of *Cyrtotrachelus* Shoenherr, 1838 from Palearctic region

- 1 Sternite V with rounded apex; sternite I-V of male without erect setae; male front leg longer than body length.....2
- Sternite V with angular apex; sternite I and II of male with erect yellowish setae laterally; male front leg shorter than body length.....3
- 2 Body surface glossy dorsally, inpunctate; sternite II sparsely punctate.....*C. buquetii buquetii* Guérin-Méneville, 1844
- Body surface finely punctate dorsally; sternite II densely punctate.....*C. buquetii borealis* (Jordan, 1894)
- 3 Striae VII-X weakly, indistinctly punctate (compared to striae I-V).....4
- Striae VII-X coarser and denser than striae I-V.....5
- 4 Pronotum red, with longitudinal black mark, not reaching the median part.....*C. thompsoni* Alonso-Zarazaga & Lyal, 1999
- Pronotum red or black, with longitudinal or circular black mark, exceeding the median part.....*C. rufopectinipes* Chevrolat, 1883
- 5 The middle line of pronotum with black mark, anterior margin with patch of black mark.....*C. himalayanus* Heller, 1923
- The middle line of pronotum red, without black mark, anterior margin without black mark.....*C. bipartitus* Hartmann, 1899



Figures 1-8. *Cyrtotrachelus thompsoni* Alonso-Zarazaga & Lyal, 1999. 1-4. Habitus: 1. male, Nangan, Matsu; 2. female, Fujian; 3. male, Taiwan; 4. female, Taiwan. 5-8. Black mark of pronotum: 5-6. hexagon form; 7-8. pentagon form. Scale bar: 10mm.



Figures 9-12. *Cyrtotrachelus thompsoni* Alonso-Zarazaga & Lyal, 1999 from Nangan Island. 9-10. Aedeagus: 9. dorsal view; 10. lateral view. 11-12. Tegmen ring: 11. dorsal view, 12. lateral view. Scale bar: 5mm.

Discussion

The intraspecific variation refers to the variation within species. This phenomenon usually appears in the morphological differences among individuals, but it also occurs in genotype, behavior, sexes and resource use (Jaenike, 1986; Langor & Sperling, 1995; McClelland et al., 1997; Herczeg & Välimäki, 2011). The intraspecific variation of pronotal black mark is noticeable in *Cyrtotrachelus thompsoni*. Generally, the black mark form can be divided into the angular upper margin and flat upper margin. There are some minor differences among individuals. For example, the specimens with angular upper margin usually have rounded lateral angles, but in some cases, there are more prominent, and the individuals with flat upper margin usually exhibit a hexagon outline, but sometimes they are emarginated medially. Although the form of the black mark seems to be irregular, we still assume that this character is different between the populations of Taiwan and Mainland China. We examined the specimens on both sides and the photos on the websites (about 35 individuals from each population), the black mark of Taiwanese population usually have a distinctive angle of the upper margin, but the population of Mainland China usually exhibits a flat, sometime emarginated upper margin. Therefore, the outline of black mark of Taiwanese species are approximate to pentagon and Chinese population are closed to hexagon. Nevertheless, the taxonomic value of this difference is still poorly known and should be explored in further studies.

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馬祖列島產臺灣大象鼻蟲與臺灣產族群型態差異記述(鞘翅目:象鼻蟲科) 及古北區產大象鼻蟲屬物種檢索表

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摘要:臺灣大象鼻蟲是亞洲地區常見的物種，廣泛分布於東亞的中國、日本、臺灣以及南亞的印度、巴基斯坦，本研究為提供本種馬祖族群和臺灣族群的前胸背板斑紋型態差異的首次記錄，同時提供標本照、雄性生殖器影像及古北區大象鼻蟲屬物種之檢索表。

關鍵詞:象鼻蟲科、椰象鼻蟲亞科、紅棕象鼻蟲族、臺灣大象鼻蟲、新紀錄、馬祖列島、型態差異