

## Korean Species of the Genus *Elampus* (Hymenoptera: Chrysididae: Elampini) with First Discovery of Female of *E. musashinus*

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### ABSTRACT

Korean species of the genus *Elampus* Spinola is taxonomically reviewed. Korean fauna of the genus *Elampus* was known by one species, *Elampus bidens* (Förster). This study reports new discovery of another Korean species *E. musashinus* (Tsuneki). This species was described based on male, and the female has been still unknown. With comparison of partial mitochondrial cytochrome c oxidase I gene sequences, the sex-association of this species is established, the Korean specimens of both sexes completely identical in their sequences targeted. Herein the female description of *E. musashinus* is presented for the first time. A key to the Korean species, as well as diagnosis and digital images are provided.

**Keywords:** *Elampus*, Chrysididae, Korea, new description, mt-DNA

### INTRODUCTION

The genus *Elampus* Spinola, 1806 (Hymenoptera, Chrysididae) is composed of 57 extant species mainly distributed in the Palearctic region (Kimsey and Bohart, 1990). Most species of the genus were known to be cleptoparasites of ground-nesting Sphecidae (Kimsey and Bohart, 1990; O'Neill, 2001).

Members of the genus *Elampus* are easily recognized by the combination of mucronate metanotum and snout-like structure on apicomedian part of tergum III (Fig. 1A–D)

To date, only one species of this genus was recorded in Korea (Ha et al., 2008). In this study, we report another species, *Elampus musashinus* (Tsuneki). This species was originally described based on the male, and its female is still unknown. We carried out sex-association test with partial mitochondrial cytochrome c oxidase I (COI) gene sequences of newly found Korean male and female specimens, and provide a description of the female of *E. musashinus* for the first time.

Morphological terminologies followed Kimsey and Bohart (1990). All measurements were taken at the maximal portion of the structure being measured.

Partial mitochondrial COI gene sequences of two Korean

individuals composed of a male and female (hypothesized as *Elampus musashinus*) were gained as follows. The total DNA was extracted from thoracic muscle tissue by using QIAamp Tissue Kit (Qiagen, Germany). For the amplification of portions of mt-DNA targeted, following pair of primers were used designed and adopted in *Elampus* by Pedersen (1996) and Niehuis and Wägele (2004), respectively: APL-2013, 5'-TATAGTTATACCATTTTAATTG-3' and AP-H-2650, 5'-TCCGACTGTAAATATGTGATGTGCTC-3'. The PCR amplification condition consisted of an initial denaturation step at 94°C for 1 min, followed by 5 cycles of 94°C for 1 min, 45°C for 1 min 30 s, 72°C for 1 min, and a 35 cycles of 94°C for 1 min, primer-specific annealing temperature 50°C for 1 min 30 s, extension at 72°C for 1 min. The final extension step was increased to 72°C for 5 min. The PCR product was then purified using PCR purification Kit (Qiagen, Germany). The COI gene fragments were directly sequenced from PCR products. DNA sequencing was performed using the ABI PRISM BigDye Terminator v3.1 Cycle Sequencing Kit under the ABI PRISM 3730XL Analyzer (Perkin-Elmer Applied Biosystem, UK). Each strand was sequenced twice for accuracy. Sequence alignment was performed using CLUSTAL X (Thompson et al., 1997).

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## SYSTEMATIC ACCOUNTS

Order Hymenoptera

Family Chrysididae Latreille, 1802

Subfamily Chrysidinae Latreille, 1802

Tribe Elampini Dahlbom, 1854

Genus *Elampus* Spinola, 1806

*Elampus* Spinola, 1806: 10. Type species: *Chrysis panzer* Fabricius, 1804, designated by Latreille, 1810: 437.

**Diagnosis.** Scapal basin flat to shallowly concave with U-shaped cross-ridges or wrinkles. Mesopleuron with omaulus and scrobal carina forming sharp ventral angle. Metanotum mucronate (Fig. 1A, B). Apicomedian part of tergum III with snout-like structure (Fig. 1D), or sometimes with a pair of processes (Fig. 1C). Fore femur with ventral carina and often sub-basally angulate in the female (Fig. 1E, F). Forewing with medial vein strongly arched.

### Key to the Korean species of the genus *Elampus* Spinola

1. Larger species: in both sexes body more than 7 mm long (Fig. 1A). Antennal flagellum I more than 4 × as long as broad. Tergum III with a pair of apicomedian processes (Fig. 1C). Head, pronotum and scutum with distinct dense punctures (Fig. 1A). ..... *E. bidens*
- Smaller species: in both sexes less than 5 mm long (Fig. 1B). Antennal flagellum I less than 3 × as long as broad. Apicomedian part of tergum III without process, but simple snout-like in shape (Fig. 1D). Head, pronotum and scutum with shallow indistinct sparse punctures (Fig. 1B). ..... *E. musashinus*

#### <sup>1</sup>\**Elampus bidens* (Förster)

*Notozus bidens* Förster, 1853: 335, ♀, Silesia, Poland [Zoologisches Museum der Humboldt Universität, Berlin].

*Elampus bidens* (Förster): Ha et al., 2008: 69–79.

**Material examined.** Korea: 1 ♀, Chungcheongbuk-do: Chungju-si, Noeun-myeon, Neungam-ri, 25 Jul 2006, Kim JK; 1 ♀, Chungju-si, Angseong-myeon, Bongpyeong-ri, 22 Jul 2007, Ha SB; 1 ♀, Gangwon-do: Jeongseon-gun, Jeongseon-eup, Mt. Gariwangsan, 6 Jul 2011, Lee HS.

**Distribution.** Southern Europe, through Siberia to Korea and Japan.

**Remarks.** Detailed description of female with Korean material is in Ha et al. (2008). Sexual dimorphism in this genus was not distinct except for condition of genal fringe and shape of fore femur (Kimsey and Bohart, 1990), i.e., in the female, the genal hairs marginally fringed are dense and regularly set

(sparser and irregularly set in the male) and lower sub-basal part of forefemur angulate (not angulate in the male). A male of this species was not available to this study, but diagnostic characteristics given in the key might be sufficient for identification of both sexes of this species. Especially a pair of apicomedian processes on tergum III is distinct.

#### <sup>2</sup>\**Elampus musashinus* (Tsuneki)

*Omalus musashinus* Tsuneki, 1986: 1, ♂, Coty Toda near Tokyo, Saitama Pref., Japan [Tsukuba, Japan].

**Description.** Female (new to science, and for not stated external characteristics, refer to male description of Tsuneki 1986). Body 4.0–4.3 mm long, fore wing 3.1–3.5 mm long.

**Coloration:** Frons, vertex, pronotum, scutum, scutellum, mesopleuron and propodeum purplish or bluish or purplish green. Metanotum bluish or purplish green except for blackish metanotal mucronate dorsal face. Clypeus green. Terga I–III golden and reddish green. Coxae, femora and tibiae bluish green or green.

**Head:** In frontal view, ca. 1.3 × as broad as long; seen from above, ca. 2.8–3.0 × as broad as long. Flagellum I ca. 2.8–3.0 × as long as broad, and ca. 1.5–1.7 × as long as flagellum II. Vertex with shallow medium-sized sparse punctures.

**Mesosoma:** Pronotum and scutum with shallow medium-sized sparse punctures. Scutellum with medium-sized moderate punctures. Mesopleuron and propodeum with large dense punctures.

**Metasoma:** Terga I–III with small-sized moderate punctures. Male. Structurally similar to female, but different in the following details. Body 4.0–4.4 mm long, fore wing 3.0–3.3 mm long. Terga I–III green or somewhat pale reddish green.

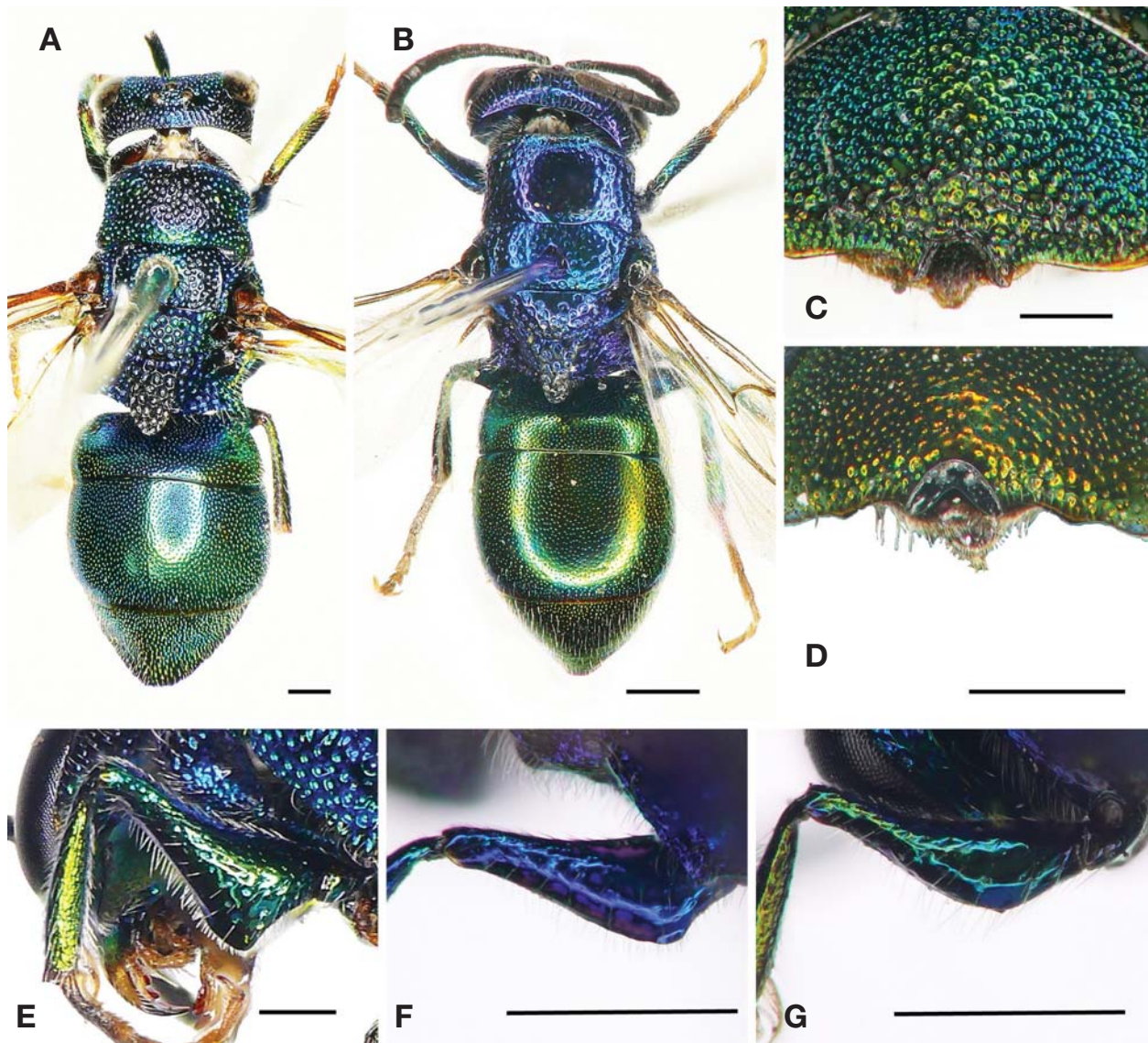
**Material examined.** Korea: 6 ♀ ♀, Jeollabuk-do, Buan-gun, Haseo-myeon, Jangsin-ri, 12 May 2012, Kim JK; 6 ♂ ♂, ditto.

**Distribution.** Korea (new record) and Japan.

**Remarks.** According to the detailed original description by Tsuneki (1986), newly discovered Korean male material herein is undoubtedly conspecific with *E. musashinus* from Japan. Their external features as well as the site of collection (area nearby beaches and related area, refer to Terayama et al., 2005) are identical. Females and males of Korean material herein were simultaneously collected in the small area, thus they were circumstantially supposed to be different sexes of the same species. To elucidate our supposition, we carried out sex-association test with the 633 bp partial mitochondrial COI gene sequence (Genbank accession no. JX839537). They were completely identical, revealing their conspecific status.

Korean specimens examined herein do not show distinct

Korean name: <sup>1</sup>\*배두치청벌, <sup>2</sup>\*꼬마배두치청벌 (신칭)



**Fig. 1.** External features of *Elampus bidens* (A, C, E) and *E. musashinus* (B, D, F, G). A, B, General habitus, dorsal, ♀; C, A pair of apicomedian processes on tergum III; D, Simple snout-like apicomedian structure of tergum III; E, Sub-basally angulated fore femur, ♀; F, Sub-basally angulated fore femur, ♀; G, Less angulated fore femur, ♂. Scale bars: A-G=0.5 mm.

sexual dimorphism, except for the above mentioned genal hair fringe and fore femur, though the coloration of some females have more golden reflection than that of the males.

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