

Redescription of *Synanthedon velox* (Fixsen) and a New Record of *Bembecia pavicevici* Toševski (Lepidoptera: Sesiidae) from Korea

Cheol-Min Lee, Yutaka Arita¹ and Yang-Seop Bae^{2*}

Division of Forest Ecology, Korea Forest Research Institute, 57 Hoegi-ro, Dongdaemun-gu, Seoul 130-712, Korea

¹Zoological Laboratory, Faculty of Agriculture, Meijo University, Tempaku-ku, Nagoya 468-8502, Japan

²Division of Life Sciences, College of Natural Science, University of Incheon 406-840, Korea

Synanthedon velox (Fixsen)의 재기재와 한국미기록종 *Bembecia pavicevici* Toševski (나비목: 유리나방과)의 보고

이철민 · 아리타 유타카¹ · 배양섭^{2*}

국립산림과학원 산림생태연구과, ¹메이조대학교 농학부, ²인천대학교 생명과학부

ABSTRACT: *Synanthedon velox* (Fixsen) is redescribed and the genus *Bembecia* is reported for the first time from Korea with *B. pavicevici* Toševski. Description, images of the adult, genitalia, and the Korean common names of two species are provided. Their host plants are listed and their biology is briefly summarized.

Key words: Lepidoptera, Sesiidae, *Synanthedon velox*, *Bembecia pavicevici*.

초록: *Synanthedon velox* (Fixsen)는 재기재하고 *Bembecia*속은 한국미기록종 *B. pavicevici* Toševski에 의해서 한국에서 처음으로 기록된다. 2종에 대한 기재, 성충의 사진, 생식기 및 국명을 제시한다. 이들의 기주식물을 제시하고 생활사를 간단히 요약하였다.

검색어: 나비목, 유리나방과, *Synanthedon velox*, *Bembecia pavicevici*.

The Sesiidae, so called clearwing moths, are mostly diurnal and generally striped with yellow or red. The general appearance is sufficiently similar to a wasp or hornet to make it likely that the moths gain a reduction in predation by Batesian mimicry. Worldwide there are 152 genera, 1,384 species (Pühringer and Kallies, 2010). The larvae of the Sesiidae are typically wood-borers, or burrow in plant roots. Many species are serious pests of fruit-tree or timber cultivation, or crop plants (Kristensen, 1999).

The genus *Synanthedon* Hübner 1819 is one of the largest groups in family Sesiidae, and 51 species are known from the

Palearctic region (Špatenka *et al.*, 1999). Presently, the genus *Synanthedon* has been recorded with 8 species in Korea (Lee *et al.*, 2004, 2005; Arita *et al.*, 2004). Arita *et al.* (2004) recorded *Synanthedon velox*, but without comments on morphological characters of Korean specimens. The genus *Bembecia* was established for *Sphinx ichneumoniformis* Denis and Schiffermüller, 1775 by Hübner (1819), and is a rather large genus of the family Sesiidae, comprising 69 species from the Palearctic region (Špatenka *et al.*, 1999). The genus *Bembecia* is reported for the first time from Korea as *B. pavicevici* Toševski. In this study, description, images of the adult, genitalia, and Korean common name on two species are provided. The biology is briefly summarized and host plants are listed.

*Corresponding author: baey@s@incheon.ac.kr

Received July 11 2011; Revised July 20 2011

Accepted September 16 2011

Materials and Methods

Terminology used in descriptions of morphology follows Špatenka *et al.* (1999). Male and female genitalia were dissected after being macerated for 4-6 min in 10% KOH heated in a double water bath. All figures and measurements (in millimeters) were made using a binocular microscope. Photographs of adults were taken with a Cannon 450D digital camera. Specimens examined in this work are kept in the University of Incheon, Incheon, Korea. Abbreviations used in the text are as follows: UIB. Division of Life Sciences, College of Natural Science, University of Incheon, Korea; ZISP. Zoological Institute, Russian Academy of Science, St. Petersburg, Russia; TL. Type locality.

Taxonomic accounts

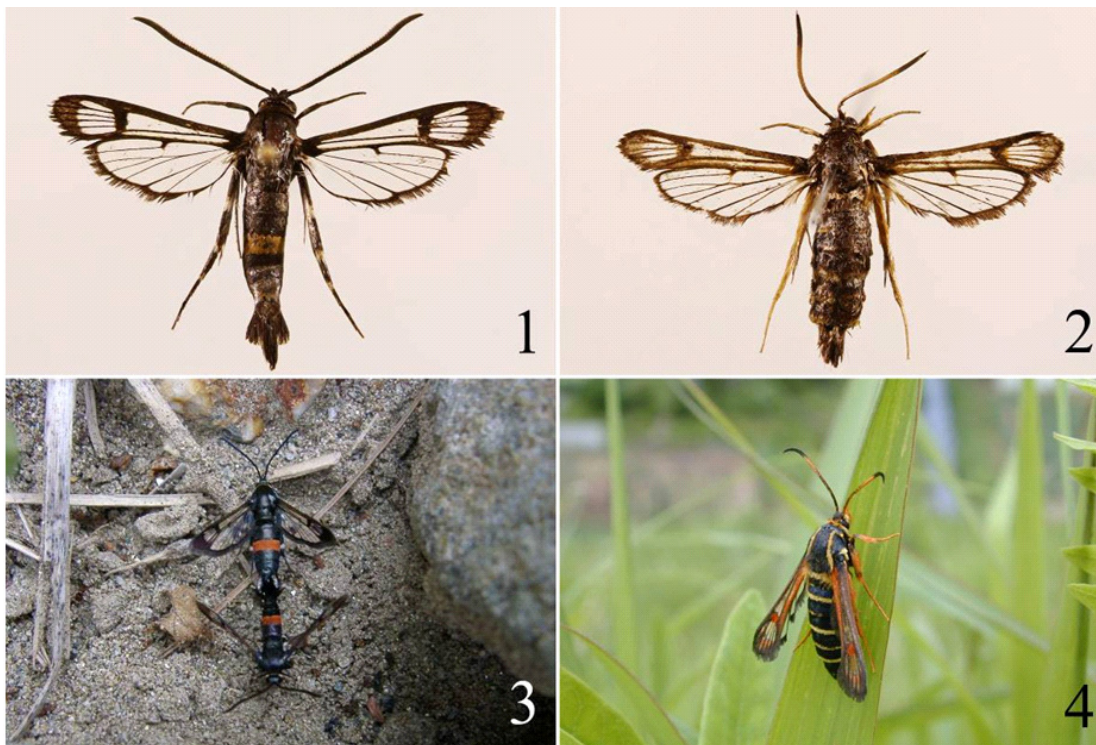
Synanthedon velox (Fixsen, 1887) 붉은띠매프시유리나방(신칭)

Korean name: bulk-eun-tti-maeb-si-yu-ri-na-bang (Figs. 1, 3, 5)
Sesia velox Fixsen, 1887, in Romanoff, Mém. Lépid. 3: 323,

pl. 15, fig. 5; Arita *et al.* 2004, Trans. Lepid. Soc. Japan. 55 (1), 1-12. TL: North Korea, Pung-Tung. Holotype ♂ (ZISP).

Diagnosis. This species is similar to *Synanthedon culiciformis* and *S. talischensis* in superficial appearance, but easily distinguished from them by the pale labial palpus.

Description. Male (Fig. 1). Wingspan, 20 mm; forewing length 9 mm; body length 12 mm; antenna 7 mm. Head: antenna dark with purple sheen; scapus black with purple sheen; frons dark brown with purple sheen, narrowly white laterally; labial palpus white, only third segment mixed with blackish brown scales; vertex black with purple sheen; occipital fringe black with purple sheen. Thorax: patagia and tegulae dark brown with purple sheen; mesothorax and metathorax dark brown with purple sheen. Legs: fore coxa dark brown with white strip exterior-basally; fore femur entirely dark brown with purple sheen; fore tibia dark brown with purple sheen, with admixture of a few yellow scales ventrally; fore tarsus dark brown with purple sheen; mid coxa and femur dark brown with purple sheen; mid tibia dark brown with purple sheen, with a small dark yellow spot exterior-medially; hind coxa and femur dark brown



Figs. 1-4. Adults. 1, *Synanthedon velox* (Fixsen, 1887); 2, *Bembecia pavicevici* Toševski, 1989; 3, *S. velox* mating on the ground; 4, *B. pavicevici* resting on a leaf.

with purple sheen; hind tibia dark brown to purple sheen, with a few pale yellow scales at base of both pairs of spurs with purple sheen; hind tarsus dorsally dark brown with purple sheen, with a small yellow spot on basal tarsomere distally, ventrally dark yellow. Forewing: basally black with purple sheen; costal margin black with purple sheen; CuA-stem and anal margin black with purple sheen; discal spot black with purple sheen, narrow; vein with in external transparent area and apical area black with purple sheen; transparent areas well-developed; external transparent area divided into five cells, posterior transparent area not exceeding distal margin of discal spot; cilia black with purple sheen. Hindwing: transparent; veins, discal spot and outer margin black with purple sheen; discal spot small, cuneiform, reaching to vein M₂; outer margin narrow, about thrice as narrow as cilia, cilia black with purple sheen. Abdomen: dorsally black with purple sheen, red 4th tergite, the red suffusion extending up to 5th tergite laterally; red 4th sternite; anal tuft black with purple sheen, with a few yellow scales distally.

Male genitalia (Fig. 5a-d). Tegumen-uncus complex relatively

broad; scopula androconialis well-developed, long, somewhat shorter than that of tegumen-uncus complex (Fig. 5a); crista gnathi medialis long, semi-oval; crista gnathi lateralis long, slightly narrower than crista gnathi medialis, distinctly narrowed toward pedunculus; valva (Fig. 5b) elongated, trapeziform-oval; crista sacculi low, pocket-shaped, proximally not separated from sensory field of setae; saccus (Fig. 5c) slightly broadened basally, with somewhat bifurcate base, somewhat longer than vinculum; aedeagus (Fig. 5d) narrow, slightly shorter than valva; vesica medially with linear sclerotized.

Material examined. 1♂, 18 VII 1998, Auraji, Chunpaeng-ri, Sangdong-up, Youngwuel-gun, GW (by sweeping, B. Tanaka), gen slide no. UIB-5562.

Distribution. Korea (GW: Pung Tung); Russia (Siberia: Buryatia).

Habitat and bionomics. According to Špatenka *et al.* (1999), the host plant of *S. velox* is *Hippophae rhamnoides* (Elaeagnaceae). The larva bores tunnels of about 20 cm in length.

Remarks. Only one male specimen is collected from July in Korea.

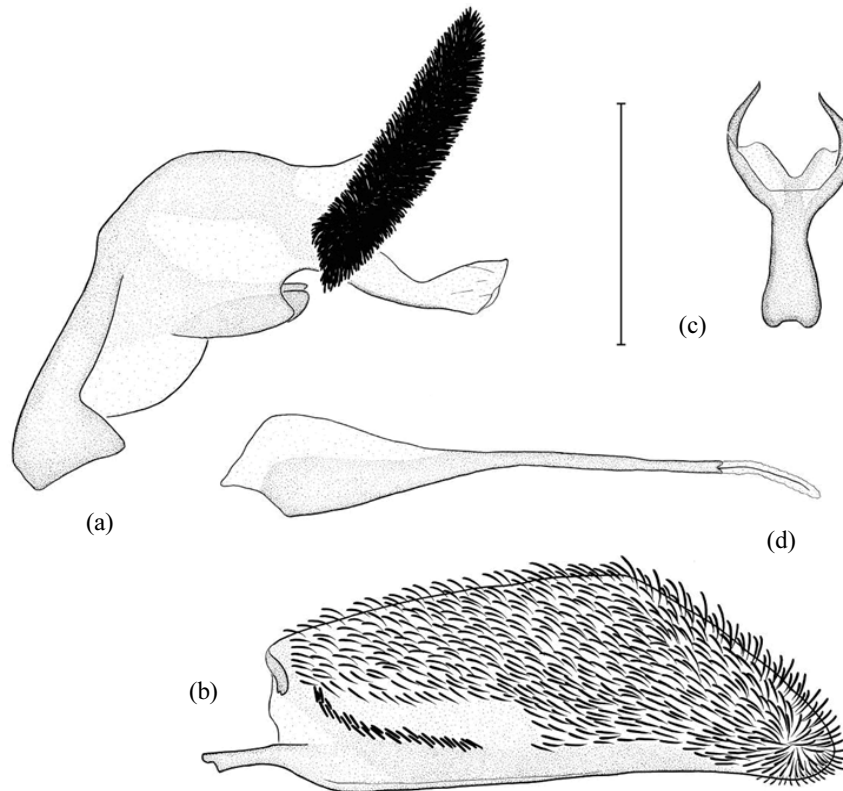


Fig. 5. Male genitalia of *Synanthedon velox* (Fixsen). SL. No. UIB-5562; 5a, tegumen-uncus complex; 5b, valva; 5c, saccus; 5d, aedeagus. scale bar = 0.5 mm.



Fig. 6. Female genitalia of *Bembecia pavicevici* Toševski. SL. No. UIB-5563. scale bar = 0.5 mm.

Bembecia pavicevici Toševski, 1989 주홍띠날개큰유리나방 (산칭)

Korean name: Ju-hong-tti-nal-gae-keun-yu-ri-na-bang (Figs. 2, 3, 6)

Bembecia pavicevici Toševski, 1989, *Fragm. Balcan.* 14: 85.

TL: Macedonia, Konsko, Gevgelia. Holotype ♂ (coll. Toševski, Beograd).

Diagnosis. This species is similar to *Bembecia scopigera* in superficial appearance, but differs from the latter by the antenna being ochreous yellow in the basal third and with narrow yellow margins on 2nd, 4th and 7th abdominal tergites in the female.

Description. Female (Fig. 2). Wingspan, 29 mm; forewing length 12 mm; body length 16 mm; antenna 8mm. Head: antenna ochreous yellow in basal and thirds, black apically; frons dark brown to black; labial palpus yellow dorsally with black scale ventrally; vertex dark brown to black. Thorax: patagium and tegula dark brown to black, inner margin yellow; mesothorax and metathorax dark brown to black with a few yellowish scales. Legs: fore coxa and fore femur dark brown to black with a few yellowish scales; fore tibia and fore tarsus yellow; mid coxa and

mid femur dark brown to black; hind tibia and hind tarsus yellow; hind coxa and hind femur dark brown to black. Forewing: costal margin brownish black; CuA-stem and anal margin reddish orange; discal spot brownish black with yellowish orange semilunate spot on outer margin; apical area golden yellow; transparent areas well-developed; exterior transparent area rounded, divided into five cells; posterior transparent area exceeding distal margin of discal spot; cilia dark brown. Hindwing: transparent, discal spot dark brown, cuneiform, reaching to vein Cu1; outer margin narrow, about thrice as narrow as cilia, cilia dark brown. Abdomen: 1st tergite entirely dark brown to black, 2nd, 4th and 7th tergites with broad yellow stripe at posterior margins, 3rd and 5th tergites narrowly yellow; anal tuft dark brown to black, with yellow scales medially and laterally.

Female genitalia (Fig. 6). Papilla analis relatively broad, well-sclerotized, covered with short setae; 8th tergite relatively broad, with a few short setae in distally; posterior apophysis somewhat longer than anterior apophysis; lamella postvaginalis slightly concave, poorly sclerotized; lamella antevaginalis absent; ostium bursae at anterior margin of 8th tergite, antrum relatively broad, long, slightly shorter than anterior apophysis, well-sclerotized; ductus bursae membranous, somewhat shorter than antrum; corpus bursae ovoid, membranous, without signum.

Material examined. 1 ♀, 28 VI 2003, Dongmyeon Res., Chuncheon-city, GW (by sweeping, H.Y. Oh), gen slide no. UIB-5563.

Distribution. Korea (GW: Chuncheon), Slovenia, Croatia (Istria, Dalmatia), Serbia Macedonia, South-Western Bulgaria, Greece.

Habitat and bionomics. According to Špatenka *et al.* (1999), the host plant is *Coronilla emerus* (Fabaceae) in Europe. The larva bores tunnels inside the roots, but older instars construct their tunnel outside along the root. The adults fly in late June to early August.

Remarks. This species is recorded from Korea for the first time.

Acknowledgements

We wish to express our sincere thanks to Mr. Y.H. Oh (Chuncheon, Korea) for a loan of specimens and photographs. This research was supported partly by the project on survey and excavation of Korean indigenous species of the National Institute of Biological Resources (NIBR) under the Ministry of

Environment, Korea. This work was supported in part by the University of Incheon Research Grant in 2008.

Literature Cited

- Arita, Y., Y.S. Bae, C.M. Lee and M. Ikeda. 2004. Sesiidae (Lepidoptera) of Korea. Trans. Lepid. Soc. Japan. 55(1): 1-12.
- Denis, M. and I. Schiffermüller. 1775. Ankündigung eines systematischen Werkes von den Schmetterlingen der Wienergegend. 324 pp., 3 pls. Wien.
- Kristensen, N.P. 1999. Lepidoptera, Moths and Butterflies, Volume 1: Evolution, Systematics, and Biogeography. Walter de Gruyter, Berlin, New York. 491 pp.
- Fixsen, C. 1887. Lepidoptera as Korea. Mémoires sur les Lépidoptères. 356 pp.
- Hübner, J. 1819. Verzeichnis bekannter Schmettlinge [1816-1826]. 432 pp., Anseiger 72 pp. Augsburg.
- Lee, C.M., Y. Arita and Y.S. Bae. 2005. Taxonomic study of the adult and immature stages of the clearwing moth, *Synanthedon haitangvora* Yang (Lepidoptera, Sesiidae), injurious to apple trees in Korea. Trans. Lepid. Soc. Japan. 56 (1): 51-60.
- Lee, C.M., Y.S. Bae and Y. Arita. 2004. Morphological Description of *Synanthedon bicingulata* (Staudinger, 1887) in life stages (Lepidoptera, Sesiidae). J. Asia-Pacific Entomol. 7(2): 177-185.
- Pühringer, F. and A. Kallies. 2010. Checklist of the Sesiidae of the world (Lepidoptera: Ditrysia). Available at: <http://members.mywave.at/m204259aa/Checklst.htm>.
- Špatenka, K., O. Gorbunov, Z. Laštuvka, I. Toševski and Y. Arita. 1999. Handbook of Palearctic Macrolepidoptera, Volume 1 Sesiidae - Clearwing Moths. Gem Publ. Co. 569 pp.
- Toševski, I. 1989. A new species of the genus *Bembecia* Hübner, 1819 from Macedonia (Lepidoptera, Sesiidae). Fragm. Balcan. 14: 81-90, 6 figs.