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RESEARCH ARTICLE

To the morphology and distribution of *Synanthedon andrenaeformis* (Laspeyres, 1801) (Lepidoptera: Sesiidae) on the Crimean Peninsula, Russia

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Abstract

The distribution of *Synanthedon andrenaeformis* (Laspeyres, 1801) on the Crimean Peninsula is described and illustrated. Some specimens were bred from larvae collected in the stems of the host plant, *Viburnum lantana*, but the majority of males were collected using artificial sex attractants. This species is found in two administrative-territorial units of the Crimean Peninsula, namely the Republic of Crimea and the Federal City of Sevastopol'. The authors discovered *Synanthedon andrenaeformis* at four localities, and the fifth one was mentioned in the literature and an online resource. This species is recorded for the Federal City of Sevastopol' for the first time.

Keywords

Clearwing moths, Synanthedoninae, Synanthedonini, new localities, artificial sex attractants, Crimea

Introduction

This work continues a series of the authors' investigations of the Lepidoptera (mainly Sesiidae and Zygaenidae) of the world fauna (see e.g. Efetov 1996a, 1996b, 1996c,

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1997, 1998a, 1998b, 1999, 2001a, 2001b, 2006, 2010, 2012, 2018; Efetov et al. 2004, 2011b, 2015a, 2019a, 2019c, 2020, 2023, 2024; Efetov and Savchuk 2009, 2013; Efetov and Tarmann 1999, 2013, 2014a, 2014b, 2016, 2017, 2020, 2024; Gorbunov 2015, 2016, 2017, 2018a, 2018b, 2018c, 2023, 2024a, 2024b, 2024c, 2024d, 2025a, 2025b, 2025c, 2026a, 2026b, 2026d; Gorbunov and Ivanov 2026; Gorbunov and Koshkin 2026, Mirić et al. 2024; Yardım et al. 2024).

As we have noted on several occasions, in the course of an in-depth study of the clearwing moth fauna of the Crimean Peninsula (Gorbunov and Efetov 1990, 2016, 2018, 2024, 2025a, 2025b, 2025c, 2025d, 2026a; Efetov et al. 2012a, 2012b; Efetov and Gorbunov 2021, 2024), three new species were described (Gorbunov and Efetov 2018; Gorbunov 2019a, 2019b), and *Bembecia eversmanni* O. Gorbunov, 2024, was recorded for the peninsula for the first time (Gorbunov et al. 2025a; Gorbunov and Efetov 2026c). In addition, we have collected a substantial amount of material from various localities across the peninsula, many of which had not previously been surveyed for the presence of taxa of the family Sesiidae. As noted in our recent publications (Gorbunov and Efetov 2024, 2025a, 2025b, 2025c, 2025d, 2026a), we have analyzed all available collection specimens, literature sources containing reliable species identifications, and data from the "Lepidoptera of Crimea" website (Savchuk 2026), as well as, occasionally, information from the online resource iNaturalist (2026).

As is well known from our publications, we have made active use of artificial sex attractants in our work. It is widely recognized that sex pheromones and sex attractants play an increasingly important role in the study of Lepidoptera: they enable researchers to discover new species, identify populations of pests or species rarely represented in collections, and monitor and control the seasonal flight activity of moths (Efetov et al. 2010, 2011a, 2015b, 2018, 2019b, 2020, 2023, 2025; Efetov and Kucherenko 2020, 2021; Drouet et al. 2021; Efetov and Gorbunov 2024; Gorbunov 2015, 2016, 2017, 2018a, 2018b, 2018c, 2022a, 2022b, 2022c, 2022d, 2023; Gorbunov et al. 2025b; Gorbunov and Efetov 2026b; Razov et al. 2017).

This publication focuses on the morphology and distribution of *Synanthedon andrenaeformis* (Laspeyres, 1801) on the Crimean Peninsula. It is appropriate to point out here that on the Crimean Peninsula three administrative-territorial units of the Russian Federation, viz. Federal City of Sevastopol', the Republic of Crimea and Genichesk District of the Kherson Region (the northern part of the Arabat Spit), are located. We were able to collect this species only in the first two regions.

Materials and methods

The descriptions of the specimens were made using a Leica® EZ4 stereomicroscope with LED illumination. All images were taken using a Sony® α450 DSLR camera equipped with a Minolta® 50 f/2.8 Macro lens. The figures of the genitalia were taken with a Keyence® BZ-9000 Biorevo Fluorescence Microscope. The processing of all

illustrations was finalized using Adobe® Photoshop® 2020 software. Pictures of the specimens are labeled with a number which consists of the name of the family, two consecutive digits and a year (e.g. Sesiidae pictures №№ 0075-0076–2023). These numbers correspond to those of the illustrated specimens in the archives of the first author. The dissected genitalia are equipped with the corresponding number placed in the microtube. This number as a label (e.g. Genitalia preparation № OG–005-2024) is pinned under the specimen and listed in the first author's archive.

The specimens were attracted to artificial female sex pheromones for sesiid moths produced by PHEROBANK®, Wijk bij Duurstede, the Netherlands.

The names of plants were verified with the WFO (2026).

On the distribution map, the locations of records from literature and Internet resources are indicated by rings, and the locations of our own catches and studied specimens from museums are shown by black dots.

The material studied or mentioned below is kept in the following collections abbreviated in the text as follows:

COGM – collection of the A.N. Severtsov Institute of Ecology and Evolution of the Russian Academy of Sciences, Moscow, Russia;

CKES – collection of Konstantin A. Efetov, Simferopol', Russia;

CTGA – collection of Theo C. Garrevoet, Antwerp, Belgium.

Results

Synanthedon andrenaeformis (Laspeyres, 1801) was first collected in the Crimea, in the vicinity of Krasnoles'ye, in the Simferopol' District, in June 2019 by the Crimean enthusiast V.V. Savchuk, using artificial sex attractants (Savchuk and Kajgorodova 2020; Savchuk 2026). A couple of years later, we were fortunate enough to collect a few males near Frontovoye, in the vicinity of Sevastopol', also using artificial sex attractants. Subsequently, we managed to collect several larvae and rear a pair of adult moths (Figs 9, 10), the female of which proved to be the first female specimen recorded for the Crimea. In addition to this, we collected a small series of males. All the males collected were drawn to the artificial sex attractants synthesized for two European species: *Synanthedon vespiformis* (Linnaeus, 1761) and *Synanthedon andrenaeformis* (Laspeyres, 1801). The males were attracted exclusively during the morning hours, up until approximately 11:00 AM. We succeeded in finding this species in four habitats across two administrative-territorial units of the Crimean Peninsula, viz. the Federal city of Sevastopol' and the Republic of Crimea. In total, *S. andrenaeformis* is currently known from five locations on the Crimean Peninsula, all of which are situated within its mountainous region (Fig. 22).

Taxonomic account

Family Sesiidae Boisduval, 1828
Subfamily Synanthedoninae Le Cerf, 1917
Tribe Synanthedonini Le Cerf, 1917
Genus *Synanthedon* Hübner, 1819

***Synanthedon andrenaeformis* (Laspeyres, 1801)**
Figs 1–22

"*Sesia Andrenaeformis*.": Laspeyres 1801: 20. Type locality: "Habitat in Hungaria" [= Hungary]. Type material: destroyed (Špatenka et al. 1999).

= "*Sphinx… anthraciniformis*." [Esper 1800]: Esper 1789–1804: 29, Tab. XLIV, Cont. 19, Fig. 1, 2. Type locality: "in der Gegend von Ofen" [= Hungary: vicinity of Budapest]. Name rejected by ICZN, Opinion Nr. 1287 (ICZN 1984).

= "*Troch*[*ilium*]. *Allantiforme*.": Newman 1832: 79. Type locality: "Habitat in Anglia". Type material: lost (Špatenka et al. 1999).

= "[*Sesia* F.]… *Andreniformis*": Staudinger 1861: 17. Unjustified emendation of *Sesia* andrenaeformis Laspeyres, 1801.

= "*Synanthedon perigordensis* sp. n.": Garrevoet and Vanholder 1996: 141, figs 1–5, 6a, 7a. Type locality: "France, Dep. Dordogne, Plaisance/Issigeae". Type material: holotype ♂ (CTGA).

Records for the Crimea. Savchuk and Kajgorodova 2020: 260, fig. 24; Laštůvka and Laštůvka 2025: 30, fig. 25, map 25; Savchuk 2026.

Description. Males (Figs 1–6) and females (Figs 7–8) of this species are virtually indistinguishable in terms of colouration. Females are merely somewhat more robust than males. Both males and females show slight variation in the number of yellow and white scales on the abdomen. The basic sizes of both males and females vary as follows: wing span 16.2–23.5 mm; body length 11.0–14.2 mm; forewing length 7.4–11.0 mm; length of antenna 5.6–8.0 mm.

Head: flagellum of antenna and scapus black with dark blue-violet sheen; frons black with dark bronze-violet sheen; vertex black with dark greenish-violet sheen; labial palpus black with dark blue-violet sheen dorsally and white ventrally; occipital fringe black; neck plate black with bright blue-violet sheen and small white spot laterally.

Thorax: patagium black with bright greenish-violet sheen; tegula, meso- and metathorax black with dark blue-violet sheen; besides this, tegula and mesothorax densely covered with thin, hair-like, black scales; thorax laterally dark grey-brown

with bright violet sheen and large yellow spot medially; posteriorly, both metepimeron and metameron dark grey-brown with dark violet sheen, covered with black, long, hair-like scales.



Figures 1–8. Variability of *Synanthedon andrenaeformis* (Laspeyres, 1801): 1–6 – Males. 1–2 – Sesiidae pictures № 0061-0062–2023; 3–4 – Sesiidae pictures № 0115-0116–2023; 5–6 – Sesiidae pictures № 0041-0042–2022. 7–8 – Female. Sesiidae pictures № 0043-0044–2022. 1, 3, 5, 7 – dorsal view; 2, 4, 6, 8 – ventral view. Scale bar: 10.0 mm.

Legs: fore coxa black with bright blue-violet sheen, sometimes with narrow white exterior margin; hind tibia black with bright blue-violet sheen and several yellow scales dorso-distally; spurs white.

Forewing: dorsally costal margin and discal spot black with dark violet sheen; CuA-stem, anal margin, veins within external transparent area and apical area black with bronze-violet sheen; cilia dark-brown to black with bronze sheen; ventrally costal margin lemon-yellow with golden hue; CuA-stem and anal margin dark brown to black with bronze-violet sheen and admixture of several lemon-yellow scales; discal spot and surface between veins R_1–R_3 black with dark violet sheen and several lemon-yellow scales at base of veins M_1–M_3; veins within external transparent area black with bronze-violet sheen; apical area black with bright bronze-violet sheen and with narrow lemon-yellow stripe between veins R_3–CuA_1; transparent areas well-developed: posterior transparent area reaching distal margin of discal spot, external transparent area with parallel margins, divided into five cells between veins R_3–CuA_1, level to vein M_2 about 0.8–1.4 times broader than discal spot and about 0.3–0.4 times as broad as apical area; discal spot with parallel margins; cilia dark-brown to black with bronze sheen.

Hindwing transparent; veins, discal spot and outer margin black with dark bronze-violet sheen; cilia dark-brown to black with bronze sheen, anally white; discal spot small, triangular, reaching base of vein M_2; outer margin narrow but slightly gradually broadened to costal margin, about as broad as cilia.

Abdomen black with dark greenish-blue sheen; dorsally tergites 2 and 4 with narrow yellow stripe distally; ventrally sternites 4–6 in male and only 4 in female white; anal tuft black with dark blue-violet sheen and straw-yellow, yellow or yellow-orange medio-distally.

Male genitalia (genitalia preparation № OG–005-2024) (Figs 11–14). Tegumen-uncus complex (Fig. 11) relatively broad; scopula androconialis well-developed, about 0.6 times as long as length of tegumen-uncus complex; crista gnathi medialis long and broad; crista gnati lateralis subcordiform, short and slightly shorter than crista gnathi medialis (Fig. 11); valva (Fig. 12) trapeziform, crista sacculi oblique, long, about 0.3 as long as length of valva, pocket-shaped, covered with one row of strong flat-topped setae; saccus (Fig. 13) narrow, slightly bilobed basally, about as long as vinculum; phallus (Fig. 14) rather thin, straight, slightly broadened subdistally, about 0.67 times as long as valva; vesica with numerous minute cornuti (Fig. 14).

Female genitalia (genitalia preparation № OG–006-2024) (Fig. 15). Papillae anales relatively large, well-sclerotized, with numerous setae; posterior apophysis about 1.2 times as long as anterior apophysis; tergite 8 relatively broad, well-sclerotized, with sparse setae at distal margin; both lamellae postvaginalis and antevaginalis undeveloped; ostium bursae well-sclerotized, distinctly cup-shaped, opening in proximal part of segment 8; antrum well-sclerotized, very short and thin; ductus bursae thin, membranous, long, about 1.5 times as long as posterior apophysis; corpus bursae elongated-ovoid without signa.

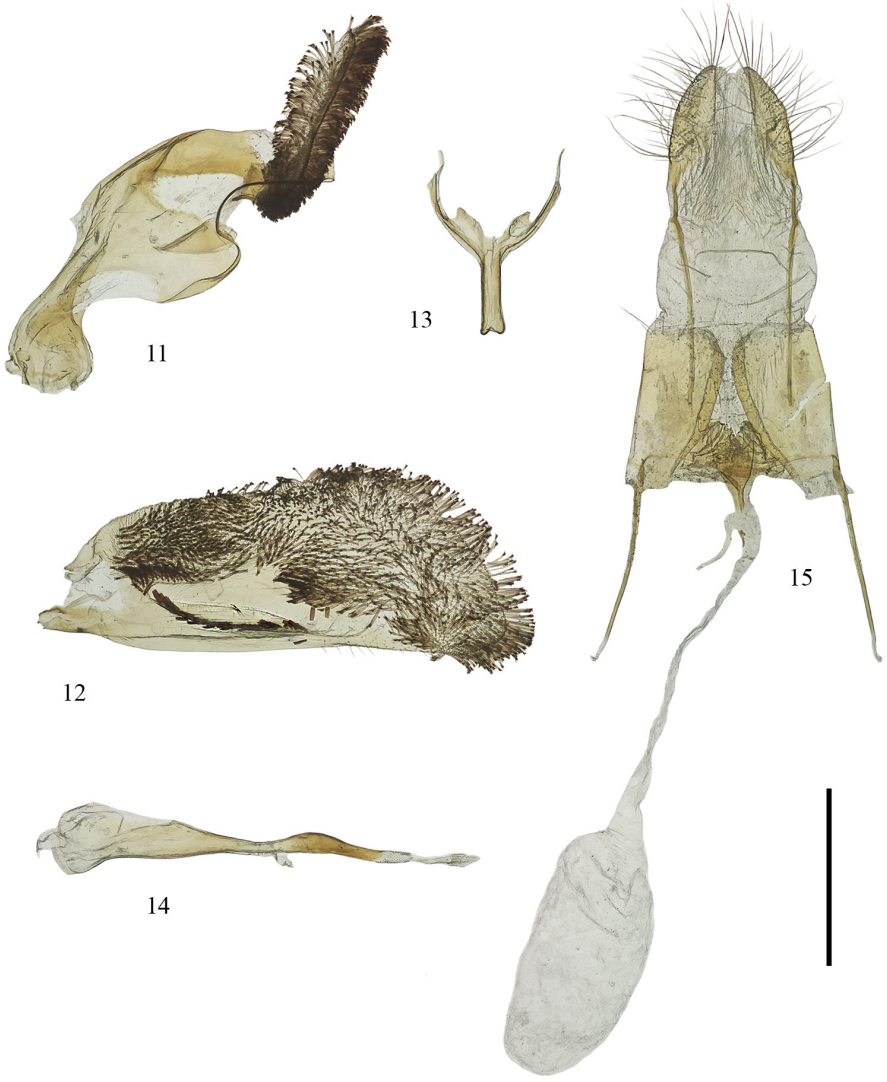


Figures 9–10. Freshly emerged specimens of *Synanthedon andrenaeformis* (Laspeyres, 1801): 9 – Male, emerged 25.VI.2022. Sesiidae pictures № 0041-0042–2022; 10 – Female, emerged 26.VI.2022. Sesiidae pictures № 0043-0044–2022.

Differential diagnosis. Among the clearwing moths of the Crimean fauna, this species could only be confused with members of the genus *Tipulia* Králíček et Povolný, 1977, of which only two species have been recorded in the region, viz. *T. spuleri* (Fuchs, 1908) and *T. tipuliformis* (Clerck, 1759). *S. andrenaeformis* differs rather well from both these species by its generally larger size and the colouration of the frons (with bright white stripe laterally in species of the genus *Tipulia* (see figs 2 and 4 in Gorbunov 2024b), vs. frons completely black with dark bronze-violet sheen in *S. andrenaeformis*) and the abdomen (dorsally, tergites 2, 4, 6, and 7 in the male, and 2, 4, and 6 in the female, each bear a thin yellow stripe distally; ventrally, the abdomen lacks white scales in the species of the genus *Tipulia*, vs. dorsally only tergite 2 and 4 with thin yellow stripe and ventrally abdomen with white scales in *S. andrenaeformis*. Compare Figs 1–8 in this article with figs 1 and 3 in Gorbunov 2024b). In *T. tipuliformis* and *T. spuleri*, the anal tuft is black and lacks yellow scales, whereas in *S. andrenaeformis*, the anal tuft always contains straw-yellow or orange-yellow scales. In addition, these species can be easy distinguished from each other by the conformation of the both male and female genitalia; compare Figs 11–15 in this publication with figs 7–11 in Gorbunov (2024b).

Bionomics. In the Crimea, we identify only *Viburnum lantana* L. (Viburnaceae) as the host plant for this species, although in Europe, *V. opulus* L. is also listed (Laštůvka and Laštůvka 2025). The young larva lives beneath the bark, but by the autumn, it bores a tunnel into the center of the trunk or branch, where it over-

winters. During its second year, the larva extends the tunnel slightly, to a length of about 6–7 cm. Before its second winter, it prepares an exit hole, which is covered by a small, round lid made of bark (Figs 16–21). The larva pupates within the tunnel inside a very loose silk cocoon. The adult moths emerge and fly in June (Figs 9, 10). Males are actively attracted to artificial sex attractants synthesized for the European *Synanthedon vespiformis* (Linnaeus, 1761).



Figures 11–15. Genitalia of *Synanthedon andrenaeformis* (Laspeyres, 1801): 11–14 – Male. Sesiidae pictures Sesiidae pictures №№ 0089-0090–2023. Genitalia preparation № OG–005-2024: 11 – tegumen-uncus complex; 12 – valva; 13 – saccus; 14 – phallus. 15 – Female. Slovakia, Šturovo, 1977, ex larva, Z. Laštůvka leg. Genitalia preparation № OG–005-2024 (COGM). Scale bar: 0.5 mm.



Figures 16–21. Aspects of the biology of *Synanthedon andrenaeformis* (Laspeyres, 1801): 16–20 – an exit hole, which is covered by a small, round lid made of bark of *Viburnum lantana*; 21 – an exit hole with exuvia on the twig of *Viburnum lantana*.

Habitat. Broad-leaved forests, where the host plant is present, either along the forest edges or deeper within the woods. They may also inhabit garden plots, where they can be found on cultivated *Viburnum lantana* or *V. opulus* shrubs.

Distribution. The species occurs locally but is nonetheless quite widely distributed across Western, Northern, and Southern Europe: from Spain, France, and England in the west to Poland, Ukraine (iNaturalist 2024), and Bulgaria in the east, and from England, Belgium, and northern Germany in the north to Italy and northern Greece in the south; additionally, isolated populations are known to exist in southern Norway and Sweden (Laštůvka and Laštůvka 2025). In Russia, apart from the Crimea, there are only reports of this species from the Samara and Nizhnyy Novgorod Regions, and, based on very old specimens, from the Republic of Tatarstan (Sachkov and Popova 2011; Gorbunov 2019c; Shmelev 2020). In the Crimea, this species is known from five localities across two administrative-territorial units: the Federal city of Sevastopol' and the Republic of Crimea (Fig. 22).

Republic of Crimea: 5 ♂♂, Russia, Crimea, Simferopol' District, Kizilovoye, 44°48.957′N, 34°02.346′E, ca 290 m., 16.VI.2023, O.G. Gorbunov and K.A. Efetov leg. (Sesiidae pictures №№ 0075-0082–2023) (COGM); 8 ♂♂, same locality, 18.VI.2023, O.G. Gorbunov and K.A. Efetov leg. (Sesiidae pictures №№ 0061-0064–2023, 0113-0124–2023) (CKES, COGM).

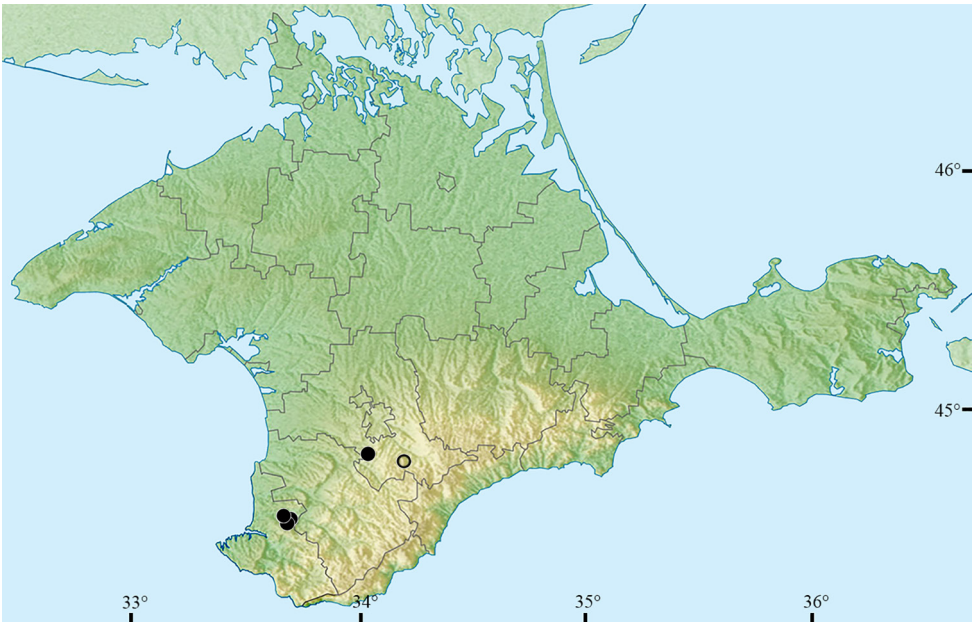


Figure 22. Distribution of *Synanthedon andrenaeformis* (Laspeyres, 1801) on the Crimean Peninsula. The ring: locality from the literature and online resource, black dots: localities of our own observations.

City of Sevastopol': 2 ♂♂, Russia, Crimea, Sevastopol', Frontovoye, 45°40.242′N, 033°43.487′E, ca 115 m., 24.VI.2021, O.G. Gorbunov and K.A. Efetov leg. (Sesiidae pictures №№ 0329-0330–2021, 0335-0336–2021) (COGM); 1 ♂, 1 ♀, Russia, Crimea, Sevastopol', Verkhnesadovoye, 44°40.409′N, 33°41.841′E, ca 97 m.,

25.V.2022, ex larvae from trunks of *Viburnum lantana* L. (Viburnaceae); moths emerged 25.VI (♂) and 26.VI.2022 (♀), O.G. Gorbunov leg. (Sesiidae pictures №№ 0041-0044–2022) (COGM); 1 ♂, Russia, Crimea, Sevastopol', Frontovoye, 44°39.417′N, 33°43.084′E, ca 144 m., 15.VI.2023, O.G. Gorbunov and K.A. Efetov leg. (Sesiidae pictures №№ 0089-0090–2023) (Genitalia preparation № OG–005-2024) (COGM).

Conclusion

As a result of the research, *S. andrenaeformis* was found in five localities across two administrative-territorial units of the Russian Federation on the Crimean Peninsula. This species is recorded for the first time in the Federal City of Sevastopol'. The host plant of the species on the Crimean Peninsula is *Viburnum lantana* L. (Viburnaceae).

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