

# On the systematics of the genus *Synanthedon* Hübner, 1819 sensu lato (Lepidoptera: Sesiidae). Part I. *Tipulia* Králíček et Povolný, 1977

O.G. Gorbunov

*A.N. Severtsov Institute of Ecology and Evolution, Russian Academy of Sciences, Leninsky prospekt 33, Moscow 119071 Russia.  
Oleg Gorbunov gorbunov.oleg@mail.ru ORCID 0000-0001-5706-621X*

**ABSTRACT.** The subgenus *Tipulia* Králíček et Povolný 1977 is restored from synonyms of the polyphyletic genus *Synanthedon* Hübner, 1819 and its rank was raised to generic: *Tipulia* Králíček et Povolný 1977, stat.res. et stat.n. The genus includes eight Palearctic species. A morphological description and differential diagnosis are provided. It is indicated that the food plants of the larvae of the genus are representatives of 14 botanical families. How to cite this article: Gorbunov O.G. 2024. On the systematics of the genus *Synanthedon* Hübner, 1819 sensu lato (Lepidoptera: Sesiidae). Part I. *Tipulia* Králíček et Povolný, 1977 // Invert. Zool. Vol.21. No.2. P.232–238. doi: 10.15298/invertzool.21.2.10

**KEY WORDS.** Lepidoptera, Synanthedonini, clearwing moths, systematics, new status, new combination, Palearctic Region.

# К систематике рода *Synanthedon* Hübner, 1819 sensu lato (Lepidoptera: Sesiidae). Часть I. *Tipulia* Králíček et Povolný, 1977

О.Г. Горбунов

*Институт проблем экологии и эволюции им. А.Н. Северцова РАН, Ленинский проспект, 33, Москва 119071, Россия. E-mail: gorbunov.oleg@mail.ru*

**РЕЗЮМЕ.** Подрод *Tipulia* Králíček et Povolný 1977 восстановлен из синонимов полифилетического рода *Synanthedon* Hübner, 1819 и его ранг повышен до родового: *Tipulia* Králíček et Povolný 1977, stat.res. et stat.n. В род включены восемь палеарктических видов. Приведено морфологическое описание и дифференциальный диагноз. Указано, что кормовыми растениями гусениц рода отмечены представители 14 ботанических семейств.

Как цитировать эту статью: On the systematics of the genus *Synanthedon* Hübner, 1819 sensu lato (Lepidoptera: Sesiidae). Part I. *Tipulia* Králíček et Povolný 1977 // Invert. Zool. Vol.21. No.2. P.232–238. doi: 10.15298/invertzool.21.2.10

**КЛЮЧЕВЫЕ СЛОВА.** Lepidoptera, Synanthedonini, бабочки-стеклянницы, *Tipulia*, систематика, новый статус, новая комбинация, Палеарктический регион.

## Introduction

When preparing a monograph on clearwing moths of the Palaearctic (Špatenka *et al.*, 1999), I had numerous questions for the co-authors and the editor regarding the generic taxonomy of

some groups, especially the tribe Synanthedonini. We had especially multi-day discussions with my now deceased friend Dr. Karel Špatenka (22.II.1955–7.IV.2021) on the taxonomic structure of the genus *Synanthedon* Hübner, 1819 (type species: *Sphinx oestriformis* Rottemburg, 1775

(= *Sphinx vespiformis* Linnaeus, 1761), subsequently designated by Newman in Westwood, 1840: 89). I managed to convince my colleague that the genus *Synanthedon* is polyphyletic and is well divided into monophyletic groups based on the structure of the genitalia of both males and females. The editor of our publication also late Prof. Dr. Class M. Naumann (20.VI.1939–15.II.2004) agreed with this. However, as was said, from a practical point of view of a simple and quick identification of sesiids of the Palaearctic, one should not go into taxonomic details, but use the system published in the form of a checklist (Heppner, Duckworth, 1981) and the list adopted by us for the Palaearctic taxa (Špatenka *et al.*, 1993).

Currently, the genus *Synanthedon* includes 234 species with 9 subspecies (Pühringer, Kallies, 2024). According to this source, species of this genus are distributed throughout the world, which undoubtedly should raise some doubts about the legality of including many species, especially exotic ones, in its composition. *Synanthedon*, as is generally accepted, includes small and medium-sized species with a well-developed and functioning proboscis and clearly defined transparent areas of the forewing. However, in my opinion, these characters are necessary, but not sufficient for inclusion of a particular taxon in the genus *Synanthedon*. The structure of both male and female genitalia has greater taxonomic weight. The genitalia in the tribe Synanthedonini are quite diverse but can be grouped relatively clearly. Such morphologically separated groups can be distinguished at the generic rank. So, a critical analysis of the morphology of the genitalia of Oriental sesiids made it possible to describe a number of new genera of Synanthedonini and restore the genera *Ichneumenoptera* Hampson, 1892 and *Paranthrenella* Strand, 1916 from synonyms (Arita, Gorbunov, 1998; Gorbunov, Arita, 1999, 2000; 2005).

At the beginning of 2024, the genus *Synanthedon* in the Palaearctic included 60 species and 9 subspecies (Pühringer, Kallies, 2024). Having studied most of the Palaearctic species of the genus *Synanthedon*, I come to the unequivocal conclusion that it, in the modern sense, turns out to be a polyphyletic taxon. I completely agree with Class M. Naumann, who, in his dissertation on the systematics and phylogeny of Holarctic Sesiidae (Naumann, 1971), identified the group

*Aegeria* sensu Curtis, 1825 (= *Thamnosphecia* Spuler, 1910) and included in it the Palearctic genera *Aegeria* sensu Curtis (= *Thamnosphecia*), *Conopia* Hübner, 1819 and *Synanthedon*. Somewhat later, in the genus *Aegeria* sensu Curtis, the subgenus *Tipulia* was distinguished (Králíček, Povolný, 1977) with the type species [*Sphinx*] *tipuliformis* Clerck, 1759, by original designation. Unfortunately, all these taxa were synonymized without any justification or explanation in the world checklist of Sesiioidea (Heppner, Duckworth, 1981), which in my opinion is incorrect.

In the present publication, which is a continuation of my research in the generic taxonomy of Sesiidae (Gorbunov, Gurko, 2017; Gorbunov, 2018, 2020, 2021a–b, 2023a–b), I restore the subgeneric taxon *Tipulia* Králíček, Povolný, 1977 from synonyms of the genus *Synanthedon* Hübner, 1819 and raise it to the generic rank.

Questions regarding the systematic position of the remaining Palaearctic species of the genus *Synanthedon* s.l. in the modern sense will be discussed in upcoming publications.

## Material and methods

The morphological examinations were made using a Leica EZ4 stereomicroscope with LED illumination. All images of the type species of genera were taken with a Sony® α450 DSLR camera equipped with a Minolta® 50 mm f/2.8 Macro lens. The figures of heads are taken with a Keyence® VHX-1000 Digital Microscope. The genitalia figures are taken with a Keyence® BZ-9000 Bioevo Fluorescence Microscope. The genitalia were photographed using a Keyence® BZ-9000 Bioevo Fluorescence Microscope. The processing of all illustrations was finalized using Adobe® Photoshop® CC2020 software.

The labels with geographical data, data on photos and preparation numbers of the genitalia are printed on white paper. All pictures of specimens are labelled with a number, consisting of letters and digits: name of the family, two consecutive digits separated by an n-dash and a year following the m-dash (e.g. SESIIDAE pictures Nos 0095-0096–2023). These letters and digit codes correspond to the numbering system of the figured specimens in the author's archive. Each preparation of the genitalia is stored in a microtube with glycerol pinned under the specimen. The dissected genitalia are equipped with the corresponding number placed in the microtube. This number as a label (e.g. Genitalia preparation No. OG-004-2022) is pinned under the specimen and listed in the author's archive.



1



2



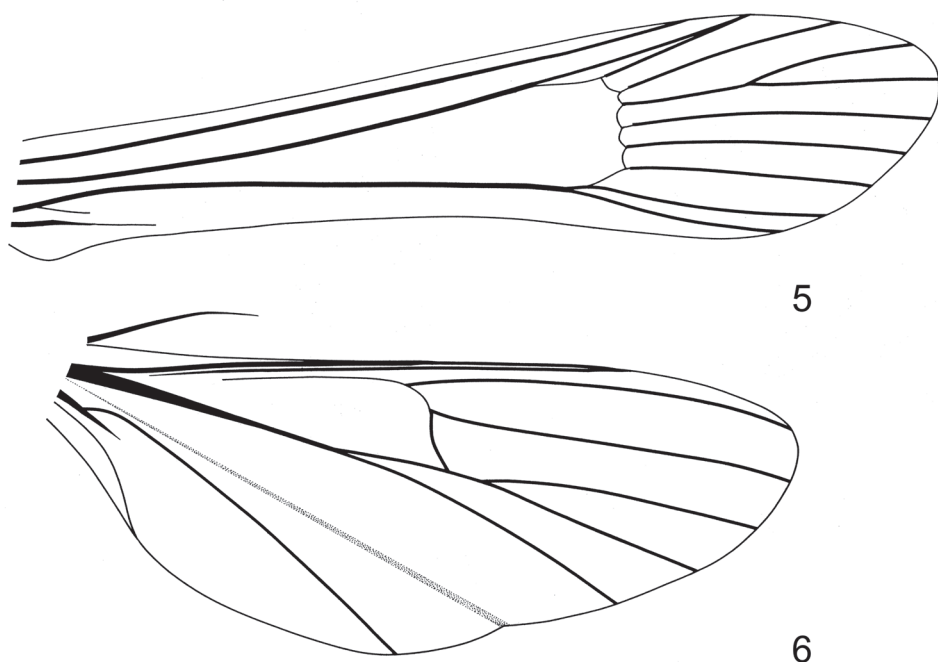
3



4

Figs 1–4. *Tipulia tipuliformis* (Clerck, 1759), comb.n.: 1–2 — ♂, Russia, Crimea, Simferopol'skiy Distr., Kizilovoye, 44.815947°N, 33.039094°E, 290 m, 18.VI.2023, O. Gorbunov, K. Efetov leg. Sesiidae picture No. 0095–2023; 1 — dorsal view; 2 — head laterally; 3–4 — ♀, same locality, 16.VI.2023, ex pupae from a twig of *Ribes nigrum* L. (Grossulariaceae), moth emerged 18.VI.2023, O. Gorbunov, K. Efetov leg. Sesiidae picture No. 0111–2023; 3 — dorsal view; 4 — head laterally.

Рис. 1–4. *Tipulia tipuliformis* (Clerck, 1759), comb.n.: 1–2 — ♂, Россия, Крым, Симферопольский район, Кизиловое, 44.815947° с.ш., 33.039094° в.д., 290 м, 18.VI.2023, О. Горбунов, К. Ефетов leg. Sesiidae снимок № 0095–2023; 1 — вид сверху; 2 — голова сбоку; 3–4 — ♀, там же, 16.VI.2023, ex pupae из веточки *Ribes nigrum* L. (Grossulariaceae), бабочка вывелась 18.VI.2023, О. Горбунов, К. Ефетов leg. Sesiidae снимок № 0111–2023; 3 — вид сверху; 4 — голова сбоку.



Figs 5–6. Wing venation of *Tipulia tipuliformis* (Clerck, 1759), comb.n.: 5 — forewing; 6 — hindwing.  
Рис. 5–6. Жилкование крыльев *Tipulia tipuliformis* (Clerck, 1759), comb.n.: 5 — переднее крыло; 6 — заднее крыло.

The material studied or mentioned herein is kept in the collection of the A.N. Severtsov Institute of Ecology and Evolution of the Russian Academy of Sciences, Moscow, Russia (COGM).

## Systematics

### Genus *Tipulia* Králíček et Povolný 1977, stat.res. et stat.n. Figs 1–11.

“[*Aegeria* sensu Curtis, 1825] ... *Tipulia* subgen. nov.”  
— Králíček, Povolný, 1977: 82. Type species: [*Sphinx*]  
*tipuliformis* Clerck, 1759, by original designation.

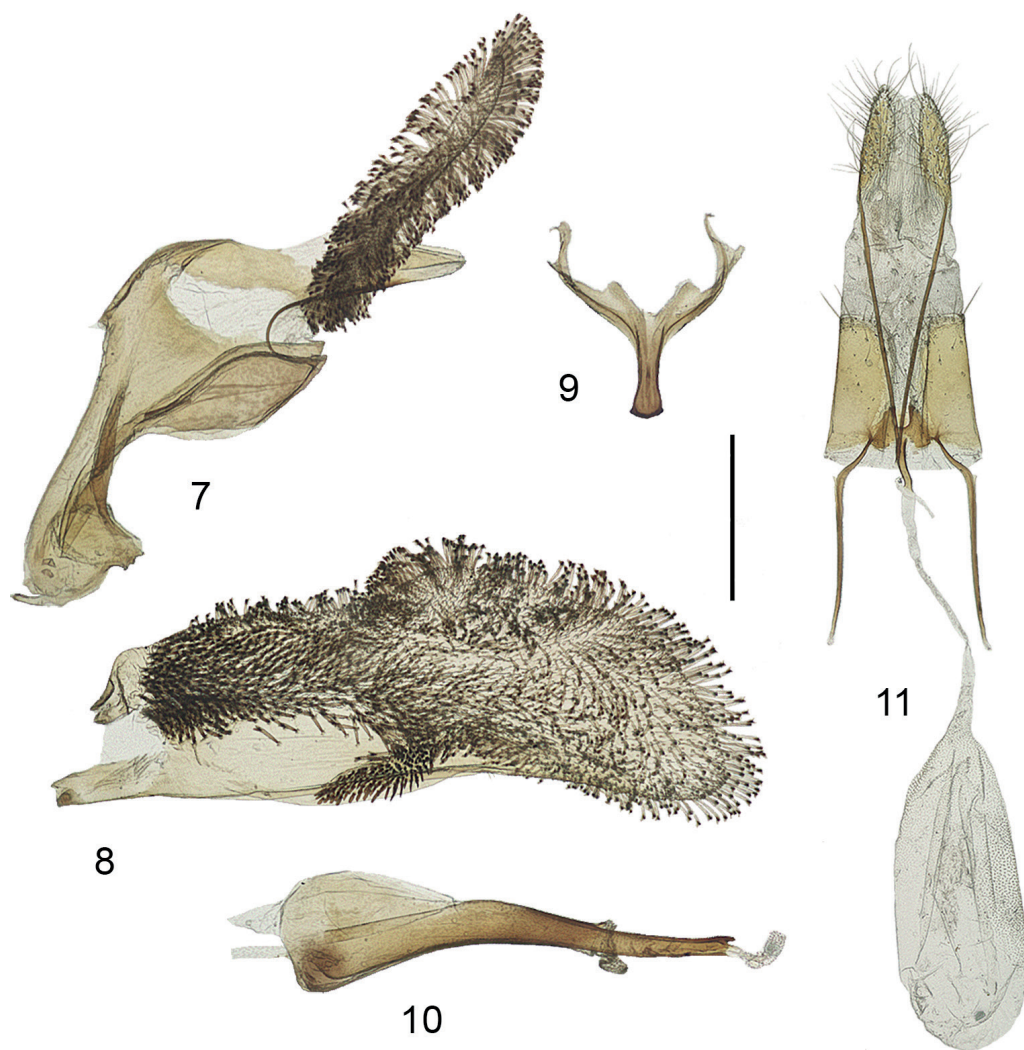
LITERATURE. Heppner, Duckworth, 1981: 29 (as a synonym of *Synanthedon* Hübner, 1819); Fletcher, Nye, 1982: 163; Špatenka *et al.*, 1993: 93 (as a subgenus of *Synanthedon* Hübner, 1819); de Freina, 1997: 62 (as a synonym of *Synanthedon* Hübner, 1819); Špatenka *et al.*, 1999: 118 (as a synonym of *Synanthedon* Hübner, 1819); Pühringer, Kallies, 2004: 22 (as a synonym of *Synanthedon* Hübner, 1819); Pühringer, Kallies, 2024 (as a synonym of *Synanthedon* Hübner, 1819).

DESCRIPTION. Small- or medium-sized *Synanthedon*-like clearwing moths (Figs 1, 3) with alar expanse 14–23 mm.

Head with antenna slightly clavate, shortly ciliate in male and without cilia in female; frons smooth-

scaled; labial palpus turned-up, slightly exceeding upper margin of frons, smooth-scaled (Figs 2, 4); proboscis well-developed, long, functional; vertex smooth-scaled, hanging upper half of frons. Thorax smooth-scaled, both metepimeron and metameron with long hair-like scales posteriorly. Abdomen smooth-scaled, with yellow bands, anal tuft well-developed. Forewing with well-developed transparent areas; veins  $R_1$  and  $R_2$  fuse distally, veins  $R_4$  and  $R_5$  stalked for about half of their length; distance between bases of veins  $R_3$ – $M_3$  approximately same (Fig. 5). Hindwing transparent, discal spot cuneiform, reaching base of common stem  $M_3$ – $CuA_1$ ; vein  $M_2$  arising from costal third of cross-vein; vein  $M_3$  arises from vein  $CuA_1$  visibly distal of cross-vein; vein  $CuP$  slightly sclerotized basally; vein 1A well-sclerotized, emerging approximately from middle of vein 2A; vein 3A extremely thin, about twice as long as vein 2A (Fig. 6).

MALE GENITALIA (*T. tipuliformis*; genital preparation No. OG–003–2024) (Figs 7–10). Tegumen-uncus complex relatively broad; scopula androconialis well-developed, about as long as tegumen-uncus complex (Fig. 7); crista gnathi medialis and crista gnathi lateralis rounded-rhomboid, long and nearly identical in size (Fig. 7); valva (Fig. 8) trapeziform-oval, crista sacculi small, oval, situated medioventrally and connected posteriorly with sensory



Figs 7–11. Genitalia of *Tipulia tipuliformis* (Clerck, 1759), comb.n.: 7–10 — ♂, Russia, Crimea, Simferopol'skiy Distr., Kizilovoye, 44.815947°N, 33.039094°E, 290 m., 16.VI.2023, O. Gorbunov, K. Efetov leg. Genitalia preparation No. OG–003-2024: 7 — tegumen-uncus complex; 8 — valva; 9 — saccus; 10 — aedeagus; 11 — ♀, Russia, Moscow Region, Orekhovo-Zuevskiy Distr., Topolinyi, 120 m, 10.VII.2021, A. Ponomaryov leg. Genitalia preparation No. OG–004-2024. Scale bar: 0.5 mm for 7–10, 0.75 mm for 11.

Рис. 7–11. Гениталии *Tipulia tipuliformis* (Clerck, 1759), comb.n.: 7–10 — ♂, Россия, Крым, Симферопольский район, Кизиловое, 44.815947° с.ш., 33.039094° в.д., 290 м, 16.VI.2023, О. Горбунов, К. Ефетов leg. Препарат гениталий № OG–003-2024: 7 — tegumen-uncus complex; 8 — valva; 9 — saccus; 10 — aedeagus; 11 — ♀, Россия, Московская область, Орехово-Зуевский район, Тополинный, 120 м, 10.VII.2021, А. Пономарёв leg. Препарат гениталий № OG–004-2024. Масштаб: 0,5 мм для 7–10, 0,75 мм для 11.

field of setae, covered with flat-topped setae; saccus (Fig. 9) narrow, flattened basally, short, noticeably shorter than vinculum; aedeagus (Fig. 10) rather thin, somewhat bisinuate, with short finger-like projection dorsodistally, about 0.6 times as long as valva; vesica with numerous minute cornuti (Fig. 10).

**FEMALE GENITALIA** (*T. tipuliformis*; genital preparation No. OG-004-2024) (Fig. 11). Papillae anales relatively large, well-sclerotized, with numerous setae; posterior apophysis distinctly longer than anterior apophysis; tergite 8 relatively broad, well-sclerotized, with sparse setae at distal half; lamella antevaginalis inversely cordate, well-sclerotized with deep rounded cut distally; ostium bursae membranous, opening near anterior margin of sternite 8; antrum short, tubular, well-sclerotized; ductus bursae thin, membranous, slightly dilating into corpus bursae; latter ovoid, without signum.

**DIFFERENTIAL DIAGNOSIS.** Superficially, representatives of the genus *Tipulia* **stat.res. et stat.n.** are very similar to some species of the genus *Synanthedon* s.l., such as *S. melliniformis* (Laspeyres 1801), *S. flaviventris* (Staudinger 1883: 177), *S. martjanovi* Sheljuzhko 1918, and *S. castanevora* Yang et Wang 1989, but they all differ well from each other in the structure of the genitalia of both the male and female (compare Figs 7–11 in this publication with corresponding figures in Yang, Wang 1989, Špatenka *et al.*, 1999 and Arita *et al.*, 2021).

Based on the structure of the crista sacculi of the male genitalia, the genus *Tipulia* **stat.res. et stat.n.** is unique among and is clearly distinguishable from all taxa of the tribe Synanthedonini. In the shape of the well-sclerotized lamella antevaginalis, this genus is somewhat similar to the genus *Kantipuria* O. Gorbunov et Arita, 1999 (type species: *Kantipuria lyu* O. Gorbunov et Arita, 1999), but these two genera differ well from each other both in appearance and in the structure of the male genitalia (compare Figs 1, 3, 7–11 in this publication with Figs 13–15, 45a–d and 50 in Gorbunov, Arita, 1999 and Figs 8, 9, 20, 26 in Liang, Hsu, 2015).

**LIFE HISTORY.** The larvae of the species of the genus are trophically associated with many tree and shrub plants from the following families: Aceraceae, Betulaceae, Celastraceae, Cupressaceae, Ebenaceae, Fagaceae, Grossulariaceae, Pinaceae, Rosaceae, Salicaceae, Ulmaceae (Arita, Gorbunov, 1995; Arita *et al.*, 1997; Špatenka *et al.*, 1996, 1999). They also live in parasitic plants of the family Lorantaceae and Viscaceae (Špatenka *et al.*, 1996), ground rhizomes of *Geranium macrorrhizum* L. (Geraniaceae) (Kallies, 1997) and vine galls of *Wisteria floribunda* (Willd.) DC. (Fabaceae) (Arita *et al.*, 1997). Life cycle is annual. Pupation of the larvae occurs either in the larval tunnel or in a cocoon, which is constructed after wintering.

**COMPOSITION.** Currently I include the following eight species in this genus: *T. tipuliformis* Clerck, 1759, **comb. n.** (type species), *T. cephiiformis* (Ochsenheimer, 1808), **comb.n.**, *T. spuleri* (Fuchs, 1908), **comb.n.**, *T. tenuis* (Butler, 1878), **comb.n.**, *T. loranthei* (Králíček, 1966), **comb.n.**, *T. colchidensis* (Špatenka et Gorbunov, 1992), **comb.n.**, *T. geranii* (Kallies, 1997), **comb.n.**, and *T. cruciati* (Bettag et Bläsius, 2002), **comb.n.** It should be noted here that all species included in this genus are very similar to each other, both externally and in the structure of the genitalia of males and females. Only *T. geranii*, **comb.n.** and *T. cruciati*, **comb.n.** somewhat separated from other relatives by its coloration (compare Figs 1 and 3 in this article and the corresponding figures in Špatenka *et al.*, 1999 with Figs 1 and 2 in Kallies, 1997 and Figs 1, 4 and 5 in Bettag, Bläsius, 2002). It should also be pointed out that representatives of this genus differ very little from each other in colour of various parts of the body and structure of the genitalia, but are very easily distinguishable by the host plant of the larvae.

**RANGE.** Palearctic Region, but *T. tipuliformis* has been introduced with black currant planting material to North America, Australia and New Zealand (Špatenka *et al.*, 1999).

**Acknowledgements.** I would like to express my heartfelt gratitude to my dear friends and colleagues who left us very early, Prof. Dr Class M. Naumann (1939–2004) and Dr Karel Špatenka (1955–2021) for fruitful discussions about clearwing moths and sincere joint expeditions. I am deeply grateful to Prof. Dr Konstantin A. Efetov (Simferopol', Russia) for his comprehensive assistance and friendly support in the process of studying the sesiids of Crimea. I am also indebted to Dr Alexandra A. Yatsuk (Moscow, Russia) for her help in photographing the details of the Sesiidae morphology and to Dr Anatoly V. Krupitsky (Moscow, Russia) for carefully checking the English of an advanced draft.

The study was conducted using the equipments of the Electron Microscopy Room of the A.N. Severtsov Institute of Ecology and Evolution, Russian Academy of Sciences (Moscow, Russia).

## References

- Arita, Yu., Gorbunov O.G. 1995. A new host plant for *Synanthedon tenue* (Butler) in Japan (Lepidoptera, Sesiidae) // Trans. Lepid. Soc. Jpn. Vol.46. No.3. P.137–140.
- Arita Yu., Gorbunov O.G. 1998. A revision of Embrik Strand's clearwing moth types (Lepidoptera: Sesiidae) from Taiwan // Chinese J. Entomol. Vol.18. P.141–165.
- Arita Yu., Gorbunov O.G., Kallies A., Yata N. 2021. Historical type specimens of Sesiidae species kept in European museums // Tinea. Vol.25. Suppl.3. P.1–211.
- Arita Yu., Gorbunov O.G., Ikeda M., Hirao K. 1997. Four new host plants of *Synanthedon tenue* (Butler) (Lepi-

- doptera, Sesiidae) in Japan // Trans. Lepid. Soc. Jpn. Vol.48. No.4. P.199–202.
- Fletcher D.S., Nye I.W.B. 1982. Bombycoidea, Castnioidea, Cossoidea, Mimallonoidea. Sesiioidea, Sphingoidea, Zygaenoidea // I.W.B. Nye (ed.). The Generic Names of Moths of the World. Vol.4. London: Trustes of the British Museum (Natural History). xiv + 192 p. <https://doi.org/10.5962/bhl.title.119597>
- Freina J.J. de 1997. Die Bombyces und Sphinges der Westpalaearktis (Insecta, Lepidoptera). Bd. 4. Sesiioidea: Sesiidae. München: EFW Edition Forschung & Wissenschaft Verlag GmbH. 432 S., 25 Taf.
- Gorbunov O.G. 2018. A new genus and species of clearwing moth (Lepidoptera, Sesiidae) from Ethiopia // Zootaxa. Vol.4497. No.4. P.492–500. <https://doi.org/10.11646/zootaxa.4497.4.2>
- Gorbunov O.G. 2020. Establishment of *Eichlinia* gen. n. for the Western hemisphere Melittiini (Lepidoptera, Sesiidae), with a catalogue of the genus // Russian Entomol. J. Vol.29. No.3. P.276–284. <https://doi.org/10.15298/rusentj.29.3.06>
- Gorbunov O.G. 2021a. Review of the genus *Aschistophleps* Hampson, 1893 (Lepidoptera, Sesiidae) of Laos // Zootaxa. Vol.5020. No.2. P.384–396. <https://doi.org/10.11646/zootaxa.5020.2.9>
- Gorbunov O.G. 2021b. A new genus of the tribe Osmiini (Lepidoptera: Sesiidae) from the Oriental Region // Far Eastern Entomologist. No.439. P.1–13. <https://doi.org/10.25221/fee.439.1>
- Gorbunov O.G. 2023a. On the systematic position of the genus *Proaegeria* Le Cerf 1916 (Lepidoptera: Sesiidae) with description of a new species // Ecologica Montenegrina. Vol.63. P.39–45. <https://dx.doi.org/10.37828/em.2023.63.4>
- Gorbunov O.G. 2023b. A new genus and a new species of the tribe Similipepsini (Lepidoptera: Sesiidae) from Africa // Russian Entomological Journal. Vol.32. No.3. P.305–312. <https://doi.org/10.15298/rusentj.32.3.05>
- Gorbunov O.G., Arita Yu. 1999. New taxa of the clearwing moths (Lepidoptera, Sesiidae) from Nepal // Tinea. Vol.16. No.2. P.106–143.
- Gorbunov O.G., Arita Yu. 2000. Study on the Synanthedonini (Lepidoptera, Sesiidae) of Vietnam // Jpn. J. syst. Ent. Vol.6. No.1. P.85–113.
- Gorbunov O.G., Arita Yu. 2005. A new genus and two new species of Synanthedonini (Lepidoptera, Sesiidae) from the Oriental Region // Tinea. Vol.18. Suppl.3. P.86–95.
- Gorbunov O.G., Gurko V.O. 2017. A new genus and species of clearwing moths (Lepidoptera: Sesiidae) from South Sudan // Zootaxa. Vol.4276. No.2. P.270–276. <https://doi.org/10.11646/zootaxa.4276.2.8>
- Heppner J.B., Duckworth W.D. 1981. Classification of the Superfamily Sesiioidea (Lepidoptera, Ditrysia) // Smithsonian Contr. Zool. Vol.314. P.1–144. <https://doi.org/10.5479/si.00810282.314>
- Kallies A. 1997. Eine neue und bemerkenswerte *Synanthedon*-Art aus Griechenland (Lepidoptera: Sesiidae) // Nachr. Ent. Ver. Apollo (N.F.). Bd.18. Nr.1. S.59–66.
- Králíček M., Povolný D. 1977. Drei neue Arten und eine neue Untergattung der Tribus Aegeriini (Lepidoptera, Sesiidae) aus der Tschechoslowakei // Vestník Českoslov. Spol. Zool. Vol.41. No.2. S.81–104.
- Liang J.-Yu., Hsu Yu-F. 2015. A review of clearwing moths in the tribe Synanthedonini, with descriptions of six new species from Taiwan (Lepidoptera: Sesiidae) // Zootaxa. Vol.4044. No.4. P.535–555. <http://dx.doi.org/10.11646/zootaxa.4044.4.4>
- Naumann C.M. 1971. Untersuchungen zur Systematik und Phylogenese der holarktischen Sesiiden (Insecta, Lepidoptera) // Bonn. Zool. Monographien. Bd.1. S.1–190.
- Pühringer F., Kallies A. 2004. Provisional check list of the Sesiidae of the world (Lepidoptera: Ditrysia) // Mitteil. Entom. Arbeitsgemeinschaft Salzkammergut. Bd.4. P.1–85.
- Pühringer F., Kallies A. 2024. Checklist of the Sesiidae of the world (Lepidoptera: Ditrysia), online database. Available from: <https://www.sesiidae.net/> (accessed 11 May 2024).
- Špatenka K., Gorbunov O., Laštůvka Z., Toševski I., Arita Yu. 1996. Die Futterpflanzen der paläarktischen Flasflügler (Lepidoptera: Sesiidae) // Nachr. Ent. Ver. Apollo (N.F.). Bd.17. Nr.1. S.1–20.
- Špatenka K., Gorbunov O., Laštůvka Z., Toševski I., Arita Yu. 1999. Sesiidae, Clearwing Moths // C.M. Naumann (ed.). Handbook of Palaearctic Macrolepidoptera. Vol.1. Wallingford: Gem Publishing Company. 569 p., 57 pls.
- Špatenka K., Laštůvka Z., Gorbunov O.G., Toševski I., Arita Yu. 1993. Die Systematik und Synonymie der paläarktischen Glasflügler-Arten (Lepidoptera, Sesiidae) // Nachr. Ent. Ver. Apollo (N.F.). Bd.14. Nr.2. S.81–114.
- Westwood J.O., 1840. Synopsis of the genera of British Insects. London: Longman, Orme, Brown, Green, and Longmans. 158 p.
- Yang J., Wang Y. 1989. [A new genus and six species of clear-wings damaging forest and fruit tree] // Forest Research. Vol.2. No.3. P.229–238 [in Chinese].

Responsible editor K.G. Mikhailov