

A new species of the genus *Milisipepsis* O. Gorbunov et Arita, 1995 (Lepidoptera: Sesiidae) from Southeast Asia, with remarks on the genus

Новый вид рода *Milisipepsis* O. Gorbunov et Arita, 1995 (Lepidoptera: Sesiidae) из Юго-Восточной Азии, с замечками о роде

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КЛЮЧЕВЫЕ СЛОВА. Lepidoptera, Tinthiinae, Similipepsini, бабочки-стекляницы, *Milisipepsis*, новый вид, Ориентальный регион, Вьетнам, Лаос.

ABSTRACT. The genus *Milisipepsis* is formally restored from a junior synonym of the genus *Similipepsis* Le Cerf, 1911, *Milisipepsis* O. Gorbunov et Arita, 1995, **stat. resurr.** The generic combination of the following species is changed: *Milisipepsis bicingulatus* (O. Gorbunov et Arita, 1995), **comb. n.**, *Milisipepsis taiwanensis* Arita et O. Gorbunov, 2001, **comb. n.**, *Milisipepsis takizawai* (Arita et Špatenka, 1989), **comb. n.**, *Milisipepsis yunnanensis* (Špatenka et Arita, 1992), **comb. n.**, and *Milisipepsis lasiocerus* (Hampson, 1919), **comb. n.** *Milisipepsis uncinatus* O. Gorbunov, **sp.n.** is described from South Vietnam and Laos. The appearance of the new species differs very well from all species of the genus. The type series of the new species was collected on moist soil.

РЕЗЮМЕ. Род *Milisipepsis* формально восстановлен из младшего синонима рода *Similipepsis* Le Cerf, 1911, *Milisipepsis* O. Gorbunov et Arita, 1995, **stat. resurr.** Родовая комбинация изменена для следующих видов: *Milisipepsis bicingulatus* (O. Gorbunov et Arita, 1995), **comb. n.**, *Milisipepsis taiwanensis* Arita et O. Gorbunov, 2001, **comb. n.**, *Milisipepsis takizawai* (Arita et Špatenka, 1989), **comb. n.**, *Milisipepsis yunnanensis* (Špatenka et Arita, 1992), **comb. n.** и *Milisipepsis lasiocerus* (Hampson, 1919), **comb. n.** *Milisipepsis uncinatus* O. Gorbunov, **sp.n.** описан из Южного Вьетнама и Лаоса. Габитуально новый вид очень хорошо отличается от всех видов рода. Типовая серия нового вида была собрана на сырой почве.

Introduction

The genus *Similipepsis* was erected for a single specimen collected in “Congo français, environs de Sam-Quito et N’Jolé” [= Gabon: Moyen-Ogooué Province, Abanga-Bigne Department, environs of Ndjolé] [Le Cerf, 1911: 305]. Two years later, the monotypic genus *Vespaegeria* was described from “Nkolentangan, ... und Alen” [= Equatorial Guinea] [Strand, 1913: 70]. Somewhat later, Hampson, not seeing the types, but on the basis of only the original description, synonymized the genus *Vespaegeria* [Hampson, 1919: 114] with *Similipepsis*. In the Lepidopterorum Catalogus, these genera were separated [Dalla Torre, Strand, 1925: 180], but already in “Seitz” the genus *Vespaegeria* was not indicated, but its type species (*Vespaegeria typica* Strand, 1913) was included in the genus *Similipepsis* [Gaede, 1929: 535]. Heppner and Duckworth again, but already formally, synonymized the genus *Vespaegeria* and included *Similipepsis* in genera “Unassigned to Subfamily” [Heppner, Duckworth, 1981: 44]. Only Wang, when describing *Similipepsis ekisi* Wang, 1984, indicated that the genus *Similipepsis* should be placed in the subfamily Tintiinae [Wang, 1984: 85], and quite recently, during the preparation of a revision of the Palearctic Sesiidae, the tribe Similipepsini was established in this subfamily [Špatenka et al., 1993]. At that time, only one genus was included in this tribe. Only seven species were included in *Similipepsis*, of which three species (*S. lasiocerus* Hampson, 1919, *S. takizawai* Arita et Špatenka, 1989 and *S. yunnanensis* Špatenka et Arita, 1992) are from East Asia and the

remaining four (*S. violaceus* Le Cerf, 1911, *S. typicus* Strand, 1913, *S. aureus* Gaede, 1929 and *S. ekisi* Wang, 1984) are from tropical Africa.

The revision of *S. violaceus*, the type species of the genus *Similipepsis*, showed significant differences, especially in the structure of the male genitalia, from four Asian species of Similipepsini known by that time. On this basis, the Asian species were separated into a distinct genus *Milisipepsis* O. Gorbunov et Arita, 1995 [Gorbunov, Arita, 1995a, b].

In their review of the Similipepsini of the Afrotropical Region [Bąkowski *et al.*, 2008], the authors treated the morphological features, especially of the male genitalia, rather superficially and without going into details. They formally synonymized the genus *Milisipepsis* and united all Asian Similipepsini, except for the genus *Gasterosteina* Arita et O. Gorbunov 2003, with Afrotropical representatives of this tribe. This nomenclatural act led to the creation of a clearly paraphyletic taxon *Similipepsis* sensu Bąkowski *et al.* [2008]. At the same time, the authors pointed out that "... most Asian *Similipepsis* species, with the exception of *S. helicella*, display a comparably homogenous morphology of habitus and genitalia. ... In contrary, the genus *Similipepsis* appears to be morphologically diverse in the Afrotropical region. African species display considerable interspecific differences in size, coloration, venation, antennal pectination and general morphology of the genitalia" [*loc. cit.*: 786]. I do not consider such morphological diversity of African taxa of Similipepsini to be interspecific, which I will report in one of the next publications [Gorbunov, in press].

As regards the Asiatic representatives of Similipepsini, I still believe that *S. helicellus* Kallies et Arita, 2001 does not belong to either *Similipepsis* or *Milisipepsis* and should be separated in a distinct genus [Arita, Gorbunov, 2003] (however, until the issue of its generic affiliation is resolved, I will cite it as *Similipepsis helicellus*). Despite the fact that I did not accept the formal synonymization of *Milisipepsis* and continued to use it in the Catalogue of the Lepidoptera of Russia [Gorbunov, 2008, 2019, 2021a, 2022a], herein I formally restore the genus *Milisipepsis* O. Gorbunov et Arita, 1995, **stat. resurr.** from a junior synonym of the genus *Similipepsis* Le Cerf, 1911 and thus change the generic combination of the following species: *Milisipepsis bicingulatus* (O. Gorbunov et Arita, 1995), **comb. n.**, *Milisipepsis taiwanensis* Arita et O. Gorbunov, 2001, **comb. n.**, *Milisipepsis takizawai* (Arita et Špatenka, 1989), **comb. n.**, *Milisipepsis yunnanensis* (Špatenka et Arita, 1992), **comb. n.**, and *Milisipepsis lasiocerus* (Hampson, 1919), **comb. n.**

In April 2018, I made a month-long trip to the Cat Tien National Park to the base of the South Branch of the Joint Russian-Vietnamese Tropical Center to study clearwing moths of the family Sesiidae. This trip turned out to be quite successful. I managed to collect several hundred Sesiids of at least a dozen species. One of them turned out to be new to science. Moreover, the same species was collected by me in 2005 in Laos. Thus, this publication is my sixth report on the results of a very successful 2005 expedition to Laos [Gorbunov, 2015,

2021b–d, 2022b] and the first one on the results of a rather successful trip to Vietnam in 2018.

Materials and methods

The morphological examinations were made using a Leica EZ4 stereomicroscope with LED illuminations. All images of collected specimens and their habitat were taken with a Sony® α450 DSLR camera equipped with a Minolta® 50 f/2.8 macro lens. The genitalia were photographed using a Keyence® BZ-9000 Biorevo fluorescence microscope. The processing of all illustrations was finalized using Adobe® Photoshop® CC 2020 software.

All labels of the holotype are cited verbatim. The labels are printed on white paper, with the exception of the type labels of the holotype and paratypes, which are printed on red paper. When quoting, labels are separated by semicolons; lines in a label are separated by a slash. All pictures of the specimens are labeled with a number, consisting of letters and digits: name of the family, two consecutive digits separated by n-dash and a year following m-dash (e.g. SESIIDAE pictures Nos 0377-0378–2018). These letter and digit codes correspond to the numbering system of the figured specimens in the author's archive. Genitalia preparations are stored in microtubes with glycerol, provided with an individual number (e.g. Genitalia preparation No OG-011-2022) and pinned under the corresponding specimens and listed in the archives of the author.

The type material of the new species is kept in the collection of the A.N. Severtsov Institute of Ecology and Evolution of the Russian Academy of Sciences, Moscow, Russia (COGM).

The names of plants were verified with the WFO [2022].

Taxonomic account

Milisipepsis uncinatus O. Gorbunov, **sp.n.**

Figs 1–12.

MATERIAL. Holotype ♂ (Figs 1–2) with labels: "S. Vietnam, Dong Nai, / Cat Tien National Park, / 11°26.439'N, 107°24.747'E, / 150 m, 25.IV.2018, / O. Gorbunov leg."; "SESIIDAE / Pictures Nos / 0377-0378–2018 / Photo by O. Gorbunov"; "HOLOTYPUS ♂ / *Milisipepsis uncinatus* / O. Gorbunov, 2022 / O. Gorbunov des., 2022".

Paratypes (38 ♂♂), 1 ♂, same locality as holotype, 10.IV.2018, O. Gorbunov leg.; 1 ♂, same locality, 11.IV.2018, O. Gorbunov leg.; 7 ♂♂, same locality, 19.IV.2018, O. Gorbunov leg. (Sesiidae pictures Nos 0357-0366–2018); 6 ♂♂, same locality, 20.IV.2018, O. Gorbunov leg.; 4 ♂♂, same locality, 21.IV.2018, O. Gorbunov leg. (Sesiidae pictures Nos 0367-0372–2018); 3 ♂♂, same locality, 22.IV.2018, O. Gorbunov leg.; 2 ♂♂, same locality, 23.IV.2018, O. Gorbunov leg. (Sesiidae pictures Nos 0373-0376–2018); 3 ♂♂, same locality, 25.IV.2018, O. Gorbunov leg. (Sesiidae pictures Nos 0379-0382–2018; a male with genitalia preparation No OG-011-2022); 1 ♂, same locality, 30.IV.2018, O. Gorbunov leg.; 8 ♂♂, same locality, 01.V.2018, O. Gorbunov leg. (Sesiidae pictures Nos 0101-0116–2019); 1 ♂, Laos, Khammouang Prov., Ban Khounkham (Na Hin), 18°13'N, 104°31'E, 200 m, 16.IV.2005, O. Gorbunov leg.; 1 ♂, same locality, 23.IV.2005, O. Gorbunov leg. (genitalia preparation No OG-061-2018).

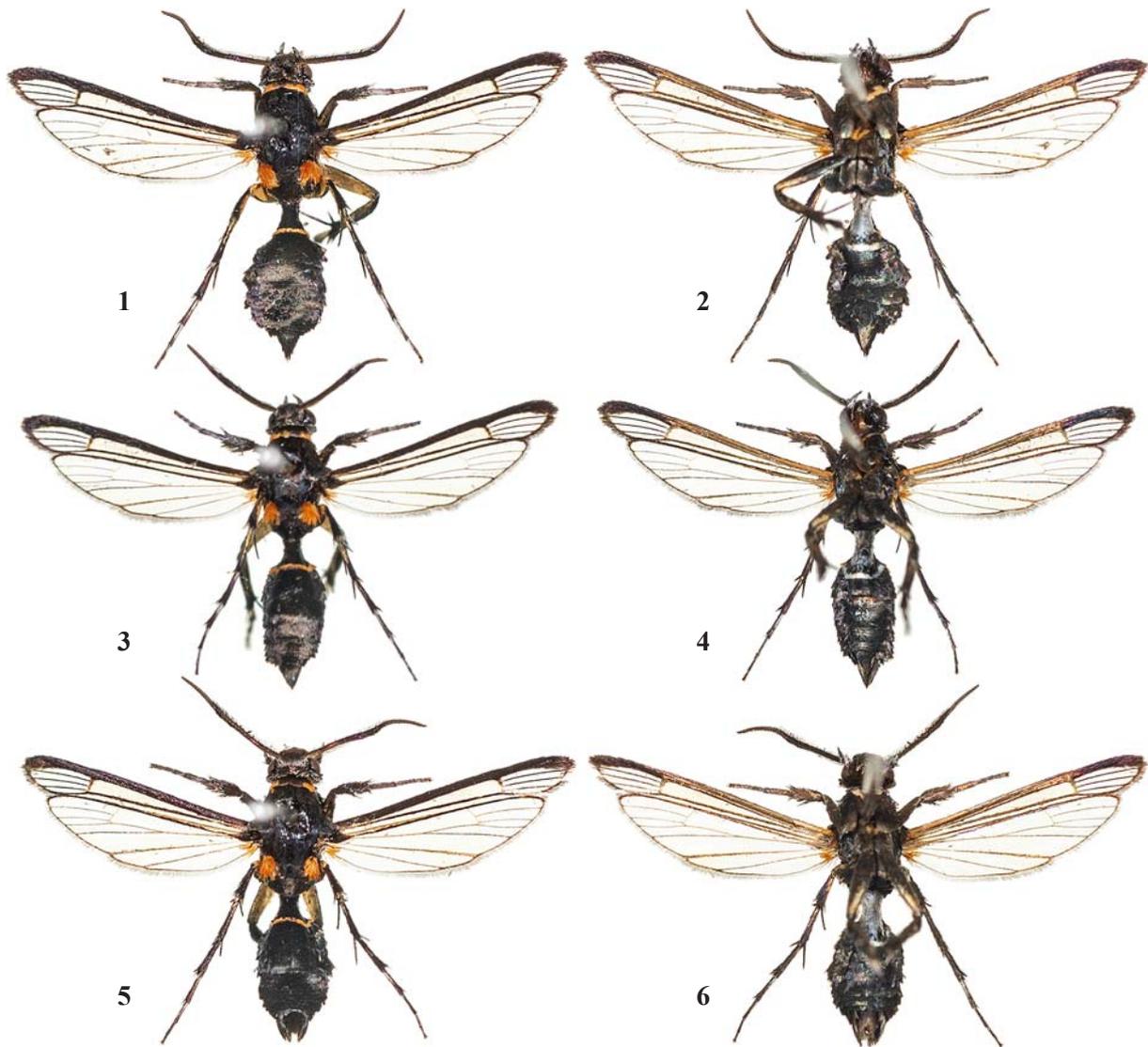
DESCRIPTION. Male (holotype) (Figs 1, 2). Alar expanse 16.1 mm; body length 9.0 mm; forewing 7.5 mm; antenna 3.7 mm.

Head: antenna dorsally gradually changes from the base from brown with bronze sheen to dark brown to black with bright violet sheen, ventrally gradually changes from pale yellow to yellow with bright golden sheen to dark brown to black with bright violet sheen, distal ciliales part (12 joints) completely dark grey-brown with bronze sheen; scapus grey-brown with blue-purple sheen dorsally and silvery-white ventrally; two basal joints of labial palpus dark brown to black with bright greenish-blue sheen and a few white scales with purple tint both internally and ventrally, apical joint white with purple tint and admixture of individual dark brown to black scales; vertex dark brown to black with bright bronze sheen; pericephalic hairs dark brown to black with bright bronze sheen and a few white scales laterally; neck plate pale yellow-orange and a few grey-brown scales with greenish sheen.

Thorax: patagia orange with a few grey-brown scales with bronze-purple sheen anteriorly; tegula and mesothorax dark

brown to black with dark blue-violet sheen; metathorax dark brown to black with greenish-bronze-violet sheen and small rounded orange spot laterally; posteriorly both metepimeron and metameron smoothly scaled, dark grey-brown with greenish-violet sheen and small orange spot on metepimeron laterally.

Legs: fore coxa dark brown to black with greenish sheen; fore femur externally brown with bronze-violet sheen, with slightly darker blue-violet sheen exterior-basally and narrow pale yellow stripe distally at exterior margin, internally entirely lemon yellow with golden sheen basally and dark brown to black with bronze-violet sheen distally; fore tibia dorsally dark brown to black with greenish sheen, ventrally dark grey-brown with bronze-violet sheen; fore tarsus dorsally dark grey-brown with blue-violet sheen and a few white scales with purple tint basally on three basal tarsomeres, ventrally brown grey-brown with bronze sheen and admixture of a few dark yellow scales on basal tarsomere; mid coxa dark brown to black with green-



Figs 1–6. Variability of *Milisipepsis uncinatus* sp.n.: 1–2 — holotype, alar expanse 16.1 mm, Sesiidae picture Nos 0377-0378–2018; 3–4 — paratype, alar expanse 15.5 mm, Sesiidae picture Nos 0367-0368–2021; 5–6 — paratype, alar expanse 15.9 mm, Sesiidae picture Nos 0379-0380–2021. Dorsal (1, 3, 5) and ventral (2, 4, 6) view.

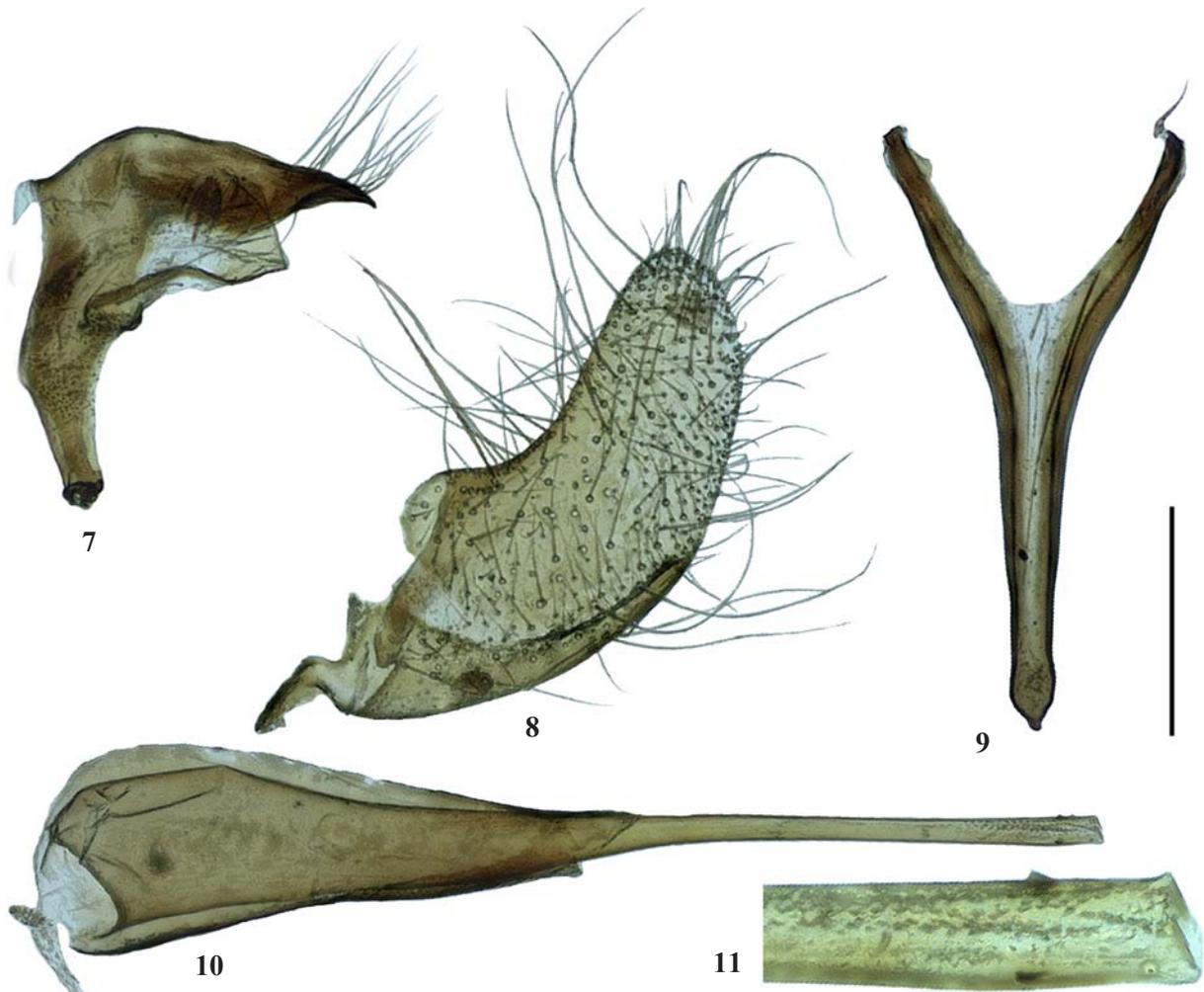
Рис. 1–6. Изменчивость *Milisipepsis uncinatus* sp.n.: 1–2 — голотип, размах крыльев 16.1 мм, Sesiidae снимки №№ 0377-0378–2018; 3–4 — паратип, размах крыльев 15.5 мм, Sesiidae снимки №№ 0367-0368–2021; 5–6 — паратип, размах крыльев 15.9 мм, Sesiidae снимки №№ 0379-0380–2021. Вид сверху (1, 3, 5) и снизу (2, 4, 6).

ish sheen; mid femur externally dark brown to black with dark blue-violet sheen, narrowly dark grey-brown with bronze-violet sheen anteriorly and narrow yellow stripe distally at posterior margin, internally lemon yellow with golden tint; mid tibia dorsally dark brown to black with greenish sheen and a few pale yellow and white scales medially, ventrally dark grey-brown with bronze-violet sheen; spurs dark brown to black with bright blue-violet sheen, external spur silvery-white internally; first mid tarsomere dorsally dark brown to black with bright blue-violet sheen, ventrally dark grey-brown with bronze-violet sheen distally and yellow with golden tint basally; remaining tarsomeres dorsally dark brown with blue-violet sheen, ventrally grey-brown with silvery tint; hind coxa dark brown to black with greenish-violet sheen and a few white scales internally; hind femur externally dark brown to black with dark blue-violet sheen, anteriorly narrowly dark grey-brown with bronze-violet sheen and a few yellow scales distally and with narrow yellow stripe distally at posterior margin, internally lemon yellow with golden tint; hind tibia externally dark brown to black with blue-violet sheen and a few pointed white scales both medially and distally, internally lemon yellow with golden tint in basal half, in distal half dark brown to black with greenish-violet sheen and a few yellow scales

basally; spurs dark brown to black with bronze-violet sheen and admixture of white scales internally on mid spurs; basal hind tarsomere completely dark brown to black with blue-violet sheen, remaining tarsomeres dark grey-brown with bronze-violet sheen, tarsomeres 2–4 each with large white spot with golden tint internally at base.

Forewing dorsally black with dark blue sheen basally; costal margin, CuA-stem and veins within external transparent area dark brown to black with dark violet sheen; anal margin and apical area dark brown with bronze sheen; discal spot brown with bronze sheen, extremely narrow with parallel margins; apical area extremely narrow, about 0.5 times as broad as cilia; transparent areas well-developed but covered with transparent scales with brownish tint; external transparent area extremely large, divided into four cells between veins R_5 – CuA_1 ; cilia dark brown with bronze sheen; ventrally costal margin from base to level of discal spot, CuA-stem, vein CuA_1 , discal spot and anal margin yellow with golden sheen; costal margin distally of discal spot, veins M_1 – M_3 and apical area dark brown to black with dark violet sheen; cilia dark brown with bronze sheen.

Hindwing transparent but covered with sparse hyaline scales with brownish hue; veins narrowly dark brown to black with dark violet sheen; both discal spot and outer



Figs 7–11. Male genitalia of *Milisipepsis uncinctus* sp.n. Genital preparation No OG–011–2022: 7 — tegumen-uncus complex; 8 — valva; 9 — saccus; 10 — aedeagus; 11 — apex of aedeagus. Scale bar 0.4 mm for 7–10, 0.1 for 11.

Рис. 7–11. Гениталии самца *Milisipepsis uncinctus* sp.n. Препарат гениталий № OG–011–2022: 7 — тегумен-ункусный комплекс; 8 — вальва; 9 — саккус; 10 — эдеагус; 11 — вершина эдеагуса. Масштаб 0,4 мм для 7–10, 0,1 для 11.

margin undeveloped; ventrally with small group of yellow-orange scales at base; cilia dark brown with bronze sheen.

Abdomen distinctly wasp-waisted: segment 1 narrowing sharply, segments 2–4 gradually broadened and segments 5–7 gradually narrowed; dorsally dark brown to black with dark greenish-violet sheen, tergite 2 with narrow orange stripe distally; ventrally sternite 1+2 white with bluish tint and admixture of dark brown to black scales with dark greenish-violet sheen and narrow pale yellow-orange stripe distally, remaining sternites completely dark brown with dark greenish-violet sheen; anal tuft extremely small.

Male genitalia (paratype, genital preparation No OG–011-2022) (Figs 7–11). Tegumen-uncus complex well-developed, tegumen not separated from uncus; uncus bilobed and pointed apically, with a few long setae dorsally; tegumen with short pointed gnathos (Fig. 7); valva (Fig. 8) strongly turned up, slightly narrowed and rounded distally, mostly covered with long and short hair-like setae; saccus long, rounded basally; vinculum narrow, about twice as long as saccus (Fig. 9); aedeagus long, ca. twice longer than valva ventrally (Fig. 10), gradually narrowing distally, with two strong but small pointed spines subapically; vesica without cornuti (Fig. 11).

Female. Unknown.

INDIVIDUAL VARIABILITY (Figs 1–6). The specimens slightly varying in the number of orange scales on the patagia and white scales on the basal sternite of the abdomen. Wing expanse 15.6–17.6 mm; body length 7.6–9.1 mm; forewing length 6.9–7.9 mm; antenna length 2.8–3.7 mm.

DIFFERENTIAL DIAGNOSIS. By the structure of the forewing, *M. uncinatus* **sp.n.** is most similar to *M. lasiocerus* (type locality: NE. India, Meghalaya, Shillong) and *S. hellicellus* (N. Vietnam, Ninh Binh Prov., Cuc Phuong). From the first

species compared, this new species is distinguished by the colouration of the patagia (black with purple-blue sheen in *M. lasiocerus*, *vs.* orange with a few grey-brown scales with bronze-purple sheen anteriorly in *M. uncinatus* **sp.n.**), metathorax (black with purple-blue shine in *M. lasiocerus*, *vs.* dark brown to black with greenish-bronze-violet sheen and small rounded orange spot laterally in the new species), and colouration of the abdomen (black with purple-blue sheen, tergite 2 with narrow white stripe distally in the species compared, *vs.* dark brown to black with dark greenish-violet sheen, tergite 2 with narrow orange stripe distally in *M. uncinatus* **sp.n.**; *cf.* Figs 1, 3 and 5 in this article with figs 40a and 40c in Arita *et al.*, 2021). In addition, the new species is somewhat smaller (wing expanse 18 mm in *M. lasiocerus*). From *S. hellicellus*, *M. uncinatus* **sp.n.** differs in the colouration of the thorax (dorsally patagia dark brown to black with greenish-purple sheen anteriorly and yellow posteriorly; tegula dark brown with greenish-purple sheen and a small yellow spot at base of forewing; meso- and metathorax entirely dark brown with greenish-purple sheen in *S. hellicellus*, *vs.* patagia orange with a few grey-brown scales with bronze-purple sheen anteriorly; tegula and mesothorax dark brown to black with dark blue-violet sheen; metathorax dark brown to black with greenish-bronze-violet sheen and small rounded orange spot laterally in *M. uncinatus* **sp.n.**; [*cf.* Figs 1, 3 and 5 in this article with figs 28 and 30 in Kallies, Arita, 2001] and abdomen dorsally (tergites 2 and 5 each with a narrow yellow to yellow-orange stripe distally; tergite 3 with a few yellow scales distally in the species compared, *vs.* only tergite 2 with narrow orange stripe distally in the new species). Apart from this, these two species are well distinguished from each other by the structure of the male genitalia [*cf.* Figs 7–11 in this article with figs 44a–d in



Fig. 12. Type locality of *Milisiopsis uncinatus* **sp.n.** near a drying puddle in Cat Tien National Park, 11°26.439' N, 107°24.747' E, 150 m, 25.IV.2018.

Рис. 12. Типовое местонахождение *Milisiopsis uncinatus* **sp.n.** у пересыхающей лужи в Национальном парке Кат Тьен, 11°26.439' с.ш., 107°24.747' в.д., 150 м, 25.IV.2018.

Kallies, Arita, 2001]. From all other congeners, this new species is easily separable by the well-developed transparent areas of the forewing [cf. Figs 1, 3 and 5 in this article with fig. 8 in Špatenka, Arita, 1992, figs 27 and 28 in Špatenka *et al.*, 1999, and figs 10 and 11 in Arita, Gorbunov, 2001] and colouration of the thorax and abdomen.

BIONOMICS. Specimens were collected in April among wasps and bees on moist soil near a drying puddle in Vietnam (Fig. 12) and a drying Nam Sanam stream in the vicinity of a village of Ban Khounkham (Nahin) in Laos. They showed typical mud behavior [Gorbunov, 2015; Skowron Volponi, Volponi, 2018] and usually appeared on wet soil early in the day.

HABITAT. In South Vietnam, this new species lives in a semi-evergreen lowland tropical rainforest dominated by tree species *Lagerstroemia calyculata* Kurz (Lythraceae), *Tetrameles nudiflora* R.Br. (Tetramelaceae), *Anogeissus acuminata* (Roxb. ex DC.) Wall. ex Guillem. et Perr. (Combretaceae), and *Haldina cordifolia* (Roxb.) Ridsdale (Rubiaceae). In Laos, it inhabits a primary monsoon semi-deciduous lowland tropical forest with *Dipterocarpus alatus* Roxb. ex G.Don, *Hopea odorata* Roxb., *H. ferrea* Laness. (Dipterocarpaceae), *Lagerstroemia cochinchinensis* Pierre ex Laness. (Lythraceae), *Azelia xylocarpa* (Kurz) Craib (Fabaceae) and *Alstonia scholaris* (L.) R.Br. (Apocynaceae) as the most dominant species.

DISTRIBUTION. Known from South Vietnam (Dong Nai Province) and Laos (Khammuang Province).

ETHYMOLOGY. The name of this new species, *unicinctus*, is derived from Latin “unus” for one or sole and “cingo” for girdle or surround, and corresponding to the colouration of the abdomen.

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