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A new species of the genus *Scoliokona* Kallies et Arita, 1998 (Lepidoptera: Sesiidae) from Halmahera, Indonesia

Новый вид рода *Scoliokona* Kallies et Arita, 1998 (Lepidoptera: Sesiidae) с Хальмахеры, Индонезия

O.G. Gorbunov
О.Г. Горбунов

A.N. Severtsov Institute of Ecology and Evolution, Russian Academy of Sciences, Leninsky prospekt 33, Moscow 119071, Russia. E-mail: gorbunov.oleg@mail.ru

Институт проблем экологии и эволюции им. А.Н. Северцова РАН, Ленинский проспект 33, Москва 119071, Россия.

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КЛЮЧЕВЫЕ СЛОВА. Lepidoptera, Paranthrenini, бабочки-стеклянницы, *Scoliokona*, новый вид, Ориентальный регион, Индонезия, Северное Молукку.

ABSTRACT. *Scoliokona jailolo* **sp.n.** is described from Halmahera Island, North Moluccas, Indonesia. The new species is very similar both externally and in the male genitalia to *S. nanlingensis* Kallies et Arita, 2014, which was described from South China. The type series of the new species was collected using artificial sex attractants.

РЕЗЮМЕ. *Scoliokona jailolo* **sp.n.** описан с острова Хальмахера, Северное Молукку, Индонезия. Новый вид очень похож как внешне, так и гениталиями самца на *S. nanlingensis* Kallies et Arita, 2014, который был описан из Южного Китая. Типовая серия нового вида была собрана с помощью искусственных половых аттрактантов.

Introduction

The Wallacea biogeographic region encompasses approximately 1680 islands covering 338 000 km^2 [Voigt et al., 2021]. It is a faunal transition zone between the Asian Sunda Shelf and Australian Sahul Shelf — continental shelves that are traced by Wallace's Line with Huxley's modification [Huxley, 1868] in the west and Lydekker's Line [Lydekker, 1896] in the east [Lohman et al., 2011]. Wallacea covers Sulawesi, the Moluccas and the Lesser Sunda Islands in East Indonesia and is globally known for its exceptional endemism.

The first data on the clearwing moths of Wallacea were presented by C. Felder in his work on Lepidoptera of the island of Ambon, collected by Dr. Doleschall, where he describes five new species [Felder, 1861]. Later, until the first quarter of the 20th century, few works were published describing new species, mainly from the island of Celebes (= Sulawesi) and North Maluku (islands of Ternate, Halmahera and Bachan) [Walker, 1865 ["1864"]; Felder, Felder, 1874; Moore, 1879; Swinhoe, 1892; Le Cerf, 1916, 1917; Hampson, 1919]. And already in the Lepidopterological Catalog we find information about 24 species, the distribution of which is associated with Wallacea [Dalla Torre, Strand, 1925]. Similar information was published somewhat later in the famous work of A. Seitz [Gaede, 1933]. On this, knowledge of the Wallacea clearwing moth fauna remained frozen until the end of the century, when it became possible to revise the types of species described by F. Le Cerf [Arita, Gorbunov, 1996]. Unfortunately, this work did not affect the taxonomic composition of the clearwing moth fauna of Wallacea, but allowed us to focus on such an interesting, but little-studied region. As a result, several papers describing five species have been published [Gorbunov, 2014, 2016, 2020a–b; Gorbunov, Arita, 2015, 2016, 2018]. Thus, in total 29 species native to Wallacea were recognized prior to this study. The present publication with the description of another species increases the total number of Wallacea species of Sesiidae to 30.

As I noted earlier, during a short-time trip to North Maluku, Indonesia in February–March 2017, I could collect several very interesting species of Sesiidae with the help of artificial sex attractants produced by PHEROBANK®, Wijk bij Duurstede, the Netherlands [Gorbunov, 2020a–b]. A detailed study of both the appearance and structure of the male genitalia of one of the collected species showed its incredible resemblance it to *Scoliokona nanlingensis* Kallies et Arita, 2014, which was most recently described from South China [Kallies et al., 2014]. In addition, this species, which I describe

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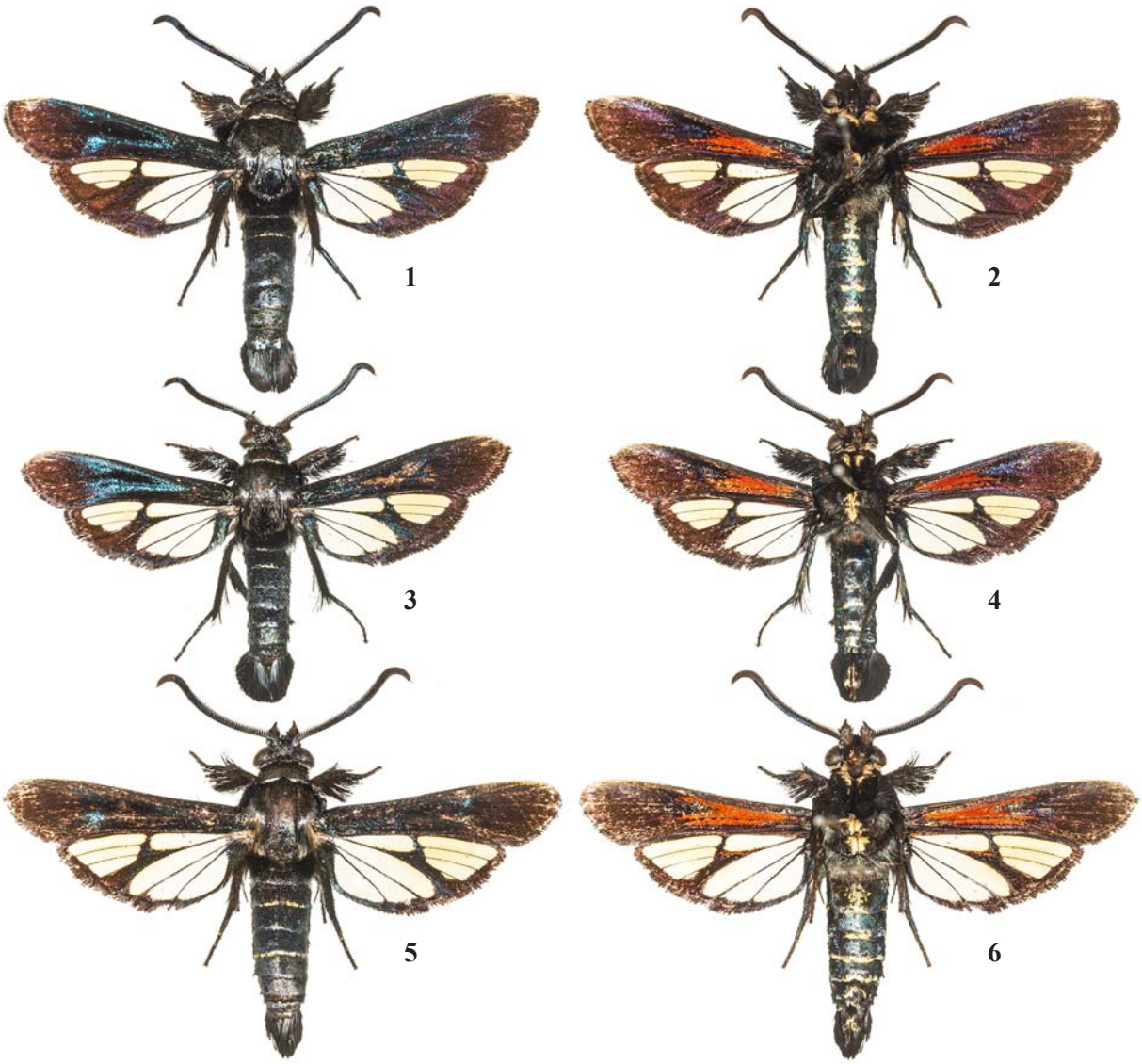
below as *Scoliokona jailolo* **sp.n.**, is very similar in male genitalia to *Nokona palawana* Kallies et Arita, 1998, described from the island of Palawan in the Philippines [Kallies, Arita, 1998]. This fact, for the umpteenth time, testifies to the heterogeneity of the genus *Nokona* Matsumura, 1931 [Toševski, Arita, 1992; Gorbunov, 2016, 2018]. Moreover, the similarity in the structure of the male genitalia of representatives of the genera *Nokona* and *Skoliokona* allows me to conclude that the last of the mentioned genera [Gorbunov, 2021] is also heterogeneous and these three species, according to the structure of the male genitalia, form a natural monophyletic group within the tribe Paranthrenini.

The unconditional genetic relationship of these three species indicates the most likely connection between the East Asian biogeographic region and Wallacea through the Philippines.

The descriptions of the specimens were made using a Leica EZ4 stereomicroscope with LED illumination. All images of the type series were taken with a Sony® á450 DSLR camera equipped with a Minolta® 50 mm 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® CC2020 software.

All labels of the holotype are cited verbatim. The labels with geographical data, imaging data and preparation numbers of the genitalia are printed on white paper, but the type label of the holotype and paratypes are printed on red paper. Each label is separated by a



Figs 1–6. Variability of *Scoliokona jailolo*, **sp.n.**: 1–2 — holotype, alar expanse 33.0 mm, Sesiidae picture Nos 0019-0020–2017; 3–4 — paratype, alar expanse 30.0 mm, Sesiidae picture Nos 0015-0016–2017; 5–6 — paratype, alar expanse 34.3 mm, Sesiidae picture Nos 0023-0024–2017; 1, 3, 5 — dorsal view; 2, 4, 6 — ventral view.

Рис. 1–6. Изменчивость *Scoliokona jailolo*, **sp.n.**: 1–2 — голотип, размах крыльев 33,0 мм, Sesiidae снимки №№ 0019-0020–2017; 3–4 — паратипы, размах крыльев 30,0 мм, Sesiidae снимки №№ 0015-0016–2017; 5–6 — паратипы, размах крыльев 34,3 мм, Sesiidae снимки №№ 0023-0024–2017; 1, 3, 5 — сверху; 2, 4, 6 — снизу.

semicolon (";") lines in a label are separated by a slash ("/"). 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 0279-0280–2021). These letter and digit codes correspond to the numbering system of the figured specimens in the author's archive. The genitalia preparation is stored in a microtube with glycerol and 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–017-2021) is pinned under the specimen and listed in the author's archive.

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

Taxonomic account

Scoliokona jailolo O. Gorbunov, **sp.n.**
Figs 1–16.

MATERIAL. **Holotype** ♂ (Figs 1–2) with labels: "Indonesia, N Maluku E, / Halmahera, 17 km SE Subaim, / 01°00.94′ N, 128°18.2′ E, / 510 m, 17.II.2017, / O. Gorbunov leg."; "SESIIDAE / Pictures Nos / 0019-0020–2017 / Photo by O. Gorbunov"; "HOLOTYPUS ♂ / *Scoliokona jailolo* / O. Gorbunov, 2022 / O. Gorbunov des., 2020".

Figs 7–12. Variability of *Scoliokona jailolo*, **sp.n.**: 7–8 — paratype, alar expanse 34.0 mm, Sesiidae picture Nos 0013-0014–2017; 9–10 — paratype, alar expanse 33.9 mm, Sesiidae picture Nos 0017-0018–2017; 11–12 — paratype, alar expanse 33.4 mm, Sesiidae picture Nos 0021-0022–2017; 7, 9, 11 — dorsal view; 8, 10, 12 — ventral view.

Рис. 7–12. Изменчивость *Scoliokona jailolo*, **sp.n.**: 1–2 — голотип, размах крыльев 34,0 мм, Sesiidae снимки №№ 0013-0014–2017; 3–4 — паратипы, размах крыльев 33,9 мм, Sesiidae снимки №№ 0017-0018–2017; 5–6 — паратипы, размах крыльев 33,4 мм, Sesiidae снимки №№ 0021-0022–2017; 7, 9, 11 — сверху; 8, 10, 12 — снизу.

Paratypes 3 ♂♂, with same locality and date as in holotype, O. Gorbunov leg. (Sesiidae pictures Nos 0017-0018–2017, 0021-0024–2017); 1 ♂, with genitalia preparation No OG–053-2018 (Figs 13–16); 2 ♂♂, with same locality as in holotype, 18.II.2017, O. Gorbunov leg. (Sesiidae pictures Nos 0013-0016–2017).

DESCRIPTION. **Male** (holotype) (Figs 1–2). Alar expanse 33.0 mm; body length 20.0 mm; forewing length 14.8 mm; antenna length 7.8 mm.

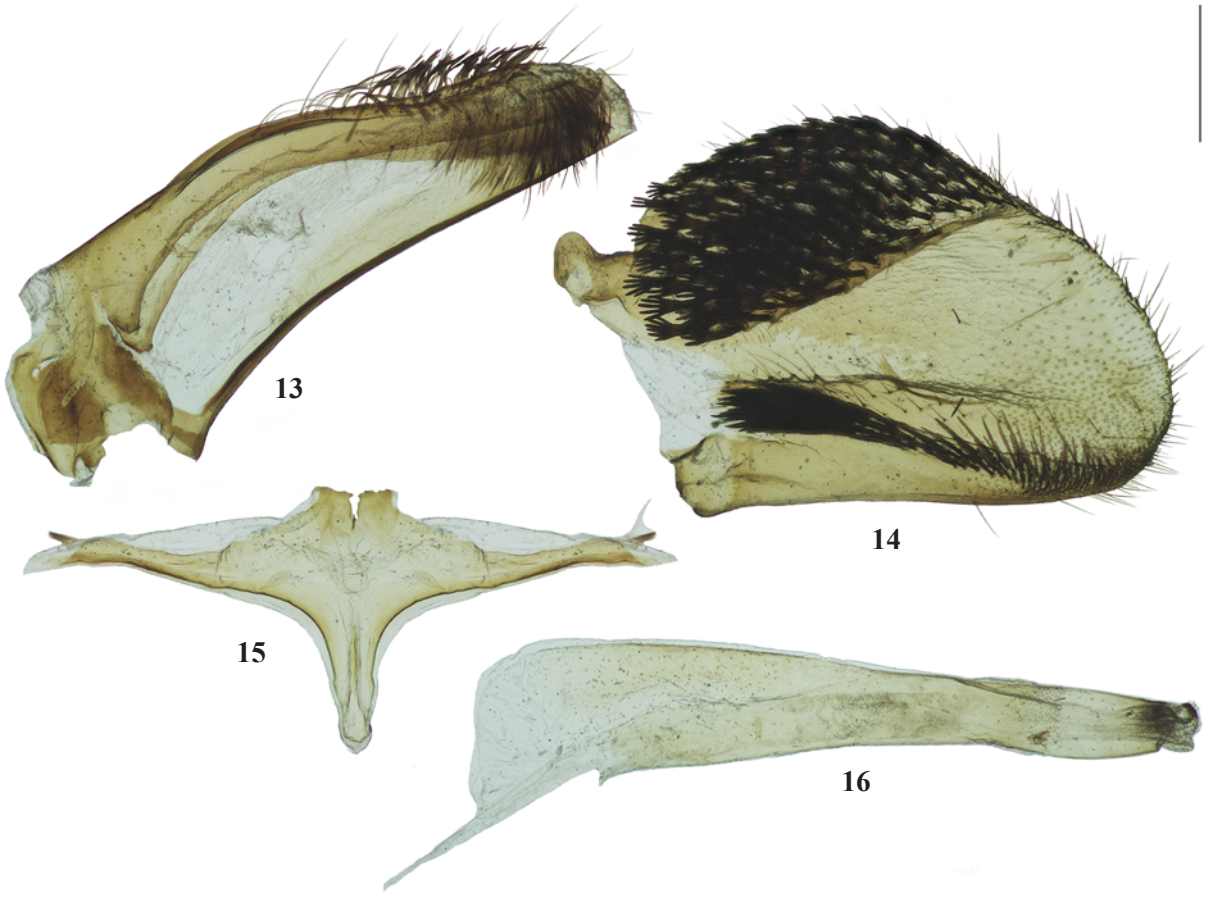
Head: antenna completely black with dark violet shine; frons dark brown to black with blue-violet shine and a few white scales with electric blue luster laterally; labial palpus dark brown to black with dark violet shine, a few dirty yellow scales on basal joint dorsally and individual yellow scales on mid joint ventrally; vertex black with anthracitic shine; pericephalic hairs dark brown to black with a few dirty yellow scales dorsally and completely dirty yellow laterally; neck plate dark brown to black with greenish shine and a few yellow scales.

Thorax: patagia dark brown to black with greenish-violet shine; tegula and mesothorax black with dark greenish shine; metathorax black with dark violet shine; laterally thorax black with bright greenish-violet shine and a few yellow scales at base of forewing; posteriorly both metepimeron and metameron black with bright greenish-violet shine, densely covered with silvery-white hair-like scales.

Legs: fore coxa black with bright greenish-violet shine and a small yellow spot basally; fore femur black with greenish-shine, externally covered with elongated, hair-like, black with dark violet shine scales; fore tibia black with greenish-violet shine with elongated, hairy-like scales both anteriorly and posteriorly; fore tarsus dark brown to black with greenish-violet shine dorsally and dark brown with bronze shine ventrally; mid coxa dark grey-brown with greenish-violet shine and a few yellow-orange scales; mid femur black with violet shine and elongated, hairy-like, silvery-white scales at posterior margin; mid tibia and spurs entirely black with dark violet shine; mid tarsus dark brown to black with greenish-violet shine dorsally and dark brown with bronze shine ventrally; hind coxa black with greenish shine and large yellow spot with golden luster internally; hind femur black with violet shine and elongated, hairy-like, silvery-white scales at posterior margin; hind tibia black with dark violet shine and tuft of elongated, hair-like, yellow-orange scales distally of base of mid spurs, spurs black with dark violet shine; hind tarsus dark brown to black with greenish-violet shine dorsally and dark brown with bronze shine ventrally.

Forewing completely opaque, dorsally black with bright shine gradually changing from base of wing to apex from green through greenish-blue to purple; ventrally dark brown to black with bright purple-violet shine and a large, triangular, brick-red spot in basal half; cilia dark brown with bronze-purple shine.

Hindwing transparent; discal spot narrow, but gradually broadened to opaque surface between veins CuA_1 and CuA_2; outer margin broad, wider between veins CuA_1 and CuP;



Figs 13–16. Male genitalia of *Scoliokona jailolo*, **sp.n.**, genital preparation No OG–053-2018: 13 — tegumen-uncus complex; 14 — valva; 15 — saccus; 16 — aedeagus. Scale bar 0.5 mm.

Рис. 13–16. Гениталии самца *Scoliokona jailolo*, **sp.n.**, препарат гениталий № OG–053-2018: 13 — тегумен-ункус комплекс; 14 — вальва; 15 — саккус; 16 — эдеагус. Масштаб: 0,5 мм.

veins scaled narrowly; dorsally opaque parts black with greenish-blue shine in basal half and bronze-purple shine in distal half; ventrally dark brown to black with bright purple-violet shine; cilia dark brown with bronze-purple shine.

Abdomen dorsally black with dark greenish shine; tergite 2 with few yellow scales distally; ventrally abdomen dark brown with greenish-blue shine; sternites 1+2–4 each with few pale yellow to yellow scales medially; each sternite medially with short yellow stripe distally; anal tuft black with dark purple-violet shine.

Male genitalia (paratype) (genital preparation No OG–053-2018) (Figs 13–16). Uncus long, narrow, slightly broadened distally, with simple setae and scales in distal third; tegumen short; gnathos narrow, without teeth; tuba analis with subscaphium narrowly sclerotized (Fig. 13); valva (Fig. 14) broad, semi-oval, oblique basally, covered with strong hand-shaped setae dorso-basally; medial crista low, with few simple setae; crista sacculi low and narrow, covered with simple setae, strong basally and soft towards apex; saccus (Fig. 15) about 0.5 times as broad as vinculum, narrow, somewhat rounded basally; aedeagus (Fig. 16) rather broad, about 1.35 as long as length of valva, distally with small carina penis situated dorso-apically; vesica with numerous minute cornuti.

Female. Unknown.

INDIVIDUAL VARIABILITY (Figs 3–12). The number of white scales with electric-blue shine on the frons laterally, yellow scales on the neck plate, brick-red scales on the forewing from below, and yellow scales on the abdomen vary slightly. In addition, the color of the pericephalic hairs varies from white to yellow. There is a male with a narrow yellow distal stripe on the forth abdominal tergite (Fig. 5) and another male without yellow scales on the dorsal side of the abdomen (Fig. 11). Besides, opaque part of the hindwing is variable in size. Moreover, this new species is somewhat variable in individual size: alar expanse 30.0–34.3 mm; body length 17.5–20.6 mm; forewing length 13.4–14.8 mm; antenna length 7.2–8.7 mm.

DIFFERENTIAL DIAGNOSIS. Both externally and in the structure of the male genitalia, this new species looks very much like *S. nanlingensis* Kallies et Arita, 2014 (type locality: China: Guangdong Province, Shaoguang, Nanling Mountains), but it differs in the colouration of the labial palpus (black, mid joint white laterally, ventrally scales black with white tips in *S. nanlingensis*, *vs*. dark brown to black with dark violet shine, a few dirty yellow scales on basal joint dorsally and individual yellow scales on mid joint ventrally in *S. jailolo* **sp.n.**), thorax ("black, with few yellow scales dorsal posteriorly" [Kallies et al., 2014: 195] in the species compared, *vs*. tegula and mesothorax black with dark greenish shine; metathorax black with dark violet shine in *S. jailolo* **sp.n.**), forewing ("opaque, black with a bluish shine; covered with indistinct reddish brown scales between cubital stem and anal margin, and in the area of the cell; ventrally similar but reddish brown scales more extensive, covering about 2/3 of the wing" [Kallies et al., 2014: 195] in *S. nanlingensis*, *vs*. opaque, dorsally black with bright shine gradually changing from base of wing to apex from green through greenish-blue to purple; ventrally dark brown to black with bright purple-violet shine and a large, triangular, brick-red spot in basal half; cilia dark brown with bronze-purple shine in the new species) and abdomen ("tergite 2 with very narrow yellow line at distal edge; sternites with small yellow wedge-shaped marks in distal part" [Kallies et al., 2014: 195] in the species compared, *vs*. abdomen dorsally black with dark greenish shine; tergite 2 (sometimes also tergite 4) with a few yellow scales distally; ventrally abdomen dark brown with greenish-blue shine; sternites 12–4 each with a few pale yellow to yellow scales medially; each sternite medially with a short yellow stripe distally in *S. jailolo* **sp.n.**; *cf*. Figs 1, 3, 5, 7, 9, and 11 in this article with figs 21 and 22 in Kallies et al. [2014]. The male genitalia of these two species are very similar. They differ from each other in minute details of the uncus (somewhat broadened subdistally and more pointed apically in *S. nanlingensis*) and shape of the valva (dorso-distal margin straight and tip turned up in the species compared; *cf*. Figs 13–16 in this article with fig. 36 in Kallies et al. [2014]).

From *S. zygophora* (Hampson 1919) (type locality: Malaysia: Sarawak, Kuching), this new species is clearly distinguishable by the colouration of the wings (forewing and opaque parts of the hindwing dark brown to black with a strong brilliant-blue metallic shine in *S. zygophora*, *vs*. forewing dorsally black with bright shine gradually changing from base of wing to apex from green through greenish-blue to purple; opaque part of hindwing black with greenish-blue shine in basal half and bronze-purple shine in distal half in *S. jailolo* **sp.n.**; *cf*. Figs 1, 3, 5, 7, 9, and 11 in this article with fig. 165 in Arita et al. [2021]).

From all other congeners [Gorbunov, 2021], *S. jailolo* **sp.n.** differs clearly by both the colouration of the different parts of the body and the conformation of the opaque part of the hindwing.

From *N. palawana*, this new species can be separated by the colouration of the forewing (dorsally "blackish-brown, basal 1/3 light brown, with a yellow spot on base; costal margin blackish" [Kallies, Arita, 1998: 267] in the species compared, *vs*. forewing dorsally black with bright shine gradually changing from base of wing to apex from green through greenish-blue to purple in *S. jailolo* **sp.n.**) and by the completely transparent hindwing; *cf*. Figs 1, 3, 5, 7, 9, and 11 in this article with fig. 18 in Kallies and Arita [1998]. In addition, these two species can be distinguished from each other by the shape of the uncus and valva in the male genitalia; compare Figs 13–16 in this article with figs 27a–d in Kallies and Arita [1998].

BIONOMICS. The larval host plant is unknown. The type series was collected in the second half of February with help of unspecific artificial sex pheromones.

HABITAT. The new species was collected in a clearing in a primary tropical evergreen forest at an altitude of about 500 m a.s.l. (Fig. 17).

Fig. 17. Habitat of *Scoliokona jailolo*, **sp.n.** Indonesia, North Maluku, East Halmahera, 17 km SE Subaim, 01°00.94′ N, 128°18.2′ E, 510 m, 17.II.2017. Photo by O. Gorbunov.

Рис. 17. Биотоп *Scoliokona jailolo*, **sp.n.** Индонезия, Северное Малуку, Восточная Хальмахера, 3 км ЮЗ Субаима, 01°00.94′ N, 128°18.2′ E, 510 m, 17.II.2017. Фото О. Горбунова.

DISTRIBUTION. The new species is known only from the type locality in the eastern region of the island of Halmahera in North Maluku province in Indonesia.

ETHYMOLOGY. The new species is named after "Jailolo", which is one of the old names for Halmahera Island, where it was collected.

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