

## To the morphology and distribution of *Sura xylocopiformis* Walker, 1856 (Lepidoptera: Sesiidae)

## К морфологии и распространению *Sura xylocopiformis* Walker, 1856 (Lepidoptera: Sesiidae)

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**КЛЮЧЕВЫЕ СЛОВА.** Sesiidae, Paranthrenini, бабочки-стекляницы, *Sura xylocopiformis*, морфология, распространение, Афротропический регион.

**ABSTRACT.** A description of the external morphology and genitalia of the male *Sura xylocopiformis* Walker, 1856 from the KwaZulu-Natal Province of the Republic of South Africa is given. The taxonomic composition of the genus *Sura* Walker, 1856 is discussed. It is suggested that the Oriental species of the genus, namely *Sura chalybea* Butler, 1876, and *Sura ignicauda* (Hampson, 1892), should be excluded from the genus *Sura* and transferred to the tribe Sesiini. In addition, it is indicated that *S. bicolor* Le Cerf, 1917, which is currently a junior synonym of *S. xylocopiformis*, has a poorly developed non-functional proboscis, which is diagnostic character of the genus *Fortikona* Bartsch et Sáfíán, 2023. For formal restoration from synonyms and transfer to the genus *Fortikona*, an analysis of the genitalia morphology is needed. It has been established that *S. xylocopiformis* is currently distributed in three provinces in the east of the Republic of South Africa, and the studied material was collected in two new localities.

**РЕЗЮМЕ.** Приведено описание внешней морфологии и гениталий самца *Sura xylocopiformis* Walker, 1856 из провинции Квазулу-Натал Южно-Африканской республики. Обсуждается таксономический состав рода *Sura* Walker, 1856. Высказано предположение, что Ориентальные виды рода, а именно *Sura chalybea* Butler 1876 и *Sura ignicauda* (Hampson, 1892) следует исключить из рода *Sura* и перенести в трибу Sesiini. Кроме этого, указано, что *S. bicolor* Le Cerf, 1917, являющийся в настоящее время младшим синонимом *S. xylocopiformis*, имеет плохо развитый нефункционирующий хоботок, который характерен для рода *Fortikona* Bartsch et Sáfíán, 2023. Для формального восстановле-

ния из синонимов и перенос в род *Fortikona* необходимо изучение морфологии гениталий. Установлено, что в настоящее время *S. xylocopiformis* распространена в трёх провинциях на востоке Южно-Африканской Республики, причём исследованный материал был собран в двух новых местонахождениях.

### Introduction

By this article the first author continues a series of publications devoted to the clearwing moths (Lepidoptera, Sesiidae) of the Afrotropical Realm (see e.g. Gorbunov [2015, 2017, 2018, 2023a–d], Gorbunov, Gurko [2017]). This paper deals with the morphology and distribution of the type species of the genus *Sura* Walker, 1856, *Sura xylocopiformis* Walker, 1856.

The genus *Sura* was established with a single South African species, *Sura xylocopiformis* Walker, 1856. Currently, this genus includes six Afrotropical and two Oriental species [Pühringer, Kallies, 2024]. Unfortunately, the male genitalia have been studied only for the type species, and the female genitalia have not been studied at all. After the establishment of the genus *Fortikona* Bartsch et Sáfíán, 2023, it turned out that some of the species that were previously included in the genus *Sura* belong to the genus *Fortikona* and were transferred to it [Bartsch *et al.*, 2023]. This fact allows us to doubt in the correctness of the synonymization of *Sura bicolor* Le Cerf, 1917 with *Sura xylocopiformis*, which was carried out by Bartsch [2008]. Moreover, Le Cerf in the original description indicates that '... la trompe courte et faible

jaunâtre, ...' [= the short and weak yellowish proboscis] [Le Cerf, 1917: 271]. This is the character of *Fortikona* [Bartsch *et al.*, 2023: 80]. Thus, with a high degree of probability, *Sura bicolor* is not a conspecific taxon with *Sura xylocopiformis*, and, moreover, may belong to the genus *Fortikona*. A solution to this problem is possible only after studying its genitalia, which are currently unattainable for us, and therefore formally we leave this taxon in the rank of a junior synonym of *Sura xylocopiformis*.

As for the Oriental species, namely *Sura chalybea* Butler, 1876, and *Sura ignicauda* (Hampson, 1892) [Pühringer, Kallies, 2024], they, in our opinion and judging by the venation of the hindwing, belong to the tribe Sesiini and should be excluded from the genus *Sura*.

Thanks to the kindness of Prof. Dr R. Yakovlev from Barnaul, Russia, we were able to study the morphology of this interesting species. The results of this study are presented below.

## Material and methods

The description is made using a Leica EZ4 stereomicroscope with LED illuminations, and images are taken with a Sony® α450 DSLR camera equipped with a Minolta® 50 f/2.8 Macro lens, but the figure of the holotype of *Sura xylocopiformis* are scanned using a Nikon® LS 2000 Cool Scan from Ektachrome® slides. A description of external morphology is given for the best preserved male. The genitalia are taken with a Keyence® BZ-9000 Bioevo Fluorescence Microscope. The processing of all illustrations is finalized with the Adobe® Photoshop® CC 2020 software.

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 0079-0080–2024). These letter and digit codes correspond to the numbering system of the figured specimens in the



**Figs 1–4.** *Sura xylocopiformis* Walker, 1856: 1–2 — male, Republic of South Africa, KwaZulu-Natal Prov., Cumberland National Reserve, 29°30'33" S, 30°30'32" E, 610 m, 22.XI.2021, R. Yakovlev leg. Sesiidae picture Nos 0079-0080–2024; 3 — male, Republic of South Africa, KwaZulu-Natal Prov., Cumberland National Reserve, 29°30'33" S, 30°30'32" E, 610 m, 22.XI.2021, R. Yakovlev leg. Sesiidae picture Nos 0081-0082–2024; 4 — female (holotype), Port Natal. 1, 3, 4 — dorsal view; 2 — ventral view. Scale bar 10.0 mm.

**Рис. 1–4.** *Sura xylocopiformis* Walker, 1856: 1–2 — самец, Южно-Африканская Республика, пров. Квазулу-Натал, Заказник Камберленд, 29°30'33" ю.ш., 30°30'32" в.д., 610 м, 22.XI.2021, Р. Яковлев leg. Sesiidae снимки №№ 0079-0080–2024; 3 — самец, Южно-Африканская Республика, пров. Квазулу-Натал, Заказник Камберленд, 29°30'33" ю.ш., 30°30'32" в.д., 610 м, 22.XI.2021, Р. Яковлев leg. Sesiidae снимки №№ 0081-0082–2024; 4 — самка (голотип), Порт Натал. 1, 3, 4 — вид сверху; 2 — вид снизу. Масштаб 10,0 мм.

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-018-2024) is pinned under the specimen and is listed in the archives of the author.

The material studied or mentioned herein is kept in the following collections abbreviated in the text as: BMNH — the collection of the Natural History Museum, London, England; CAIC — the collection of A.V. Ivanov, Cheboksary, Chuvash Republic, Russia; COGM — the collection of A.N. Severtsov Institute of Ecology and Evolution of the Russian Academy of Sciences, Moscow, Russia; MHNP — Museum National d'Histoire Naturelle, Paris, France.

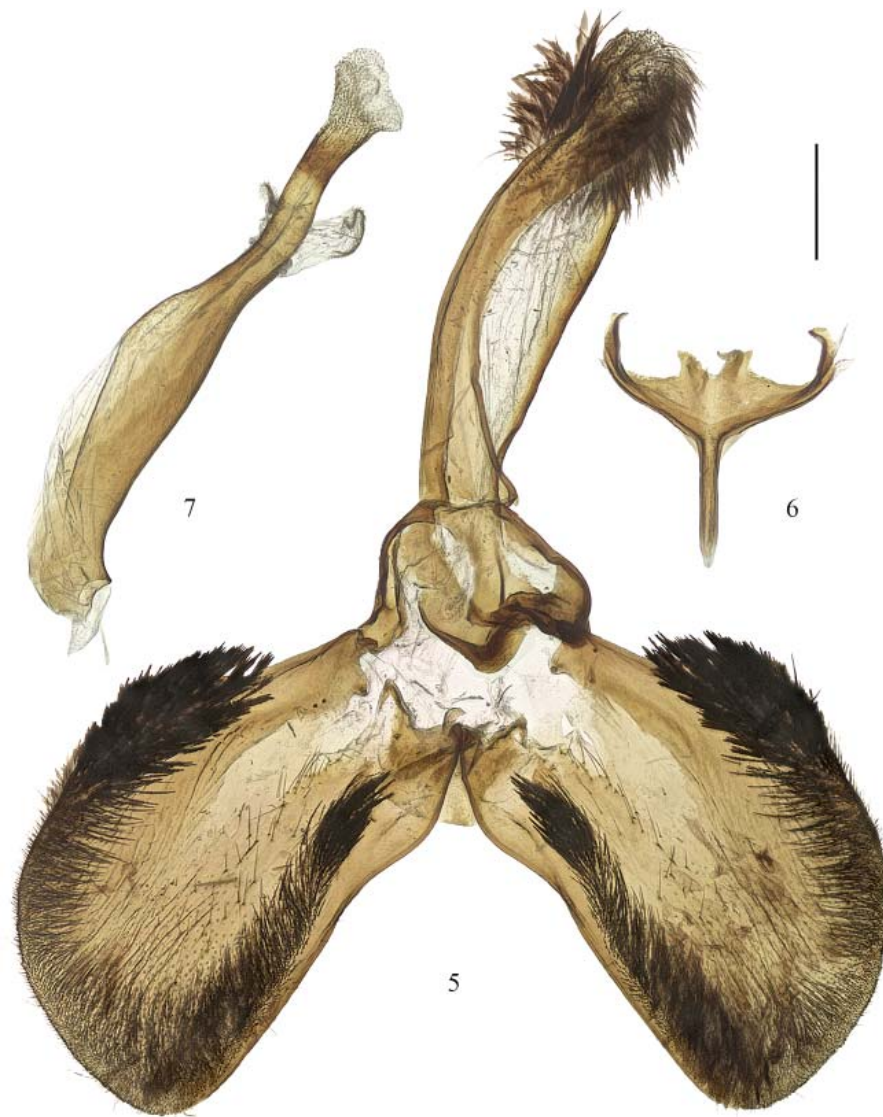
### Taxonomic account

*Sura xylocopiformis* Walker, 1856  
Figs 1–10.

"*Sura Xylocopiformis*." — Walker 1856: 65. Type locality: "Port Natal." [= South Africa: KwaZulu-Natal Prov., Durban]. Holotype ♀ (Fig. 4) (BMNH).

= "*Sura bicolor* n. sp." — Le Cerf, 1917: 271. Type locality: "... Nord Transvaal, Zoutpansberg, Shilouvane, ..." [= South Africa: Limpopo Prov., Vhembe Distr., Soutpansberg]. Syntypes ♂ and ♀ (MHNP).

Literature. Boisduval, 1875: 467 (*Sura xylocopiformis*); Le Cerf, 1916: 11, pl. CCCLXXVII, figs 3155, 3156 (*Sura ? xylocopiformis* ♂♀ Walk.); Hampson, 1919: 99 (*Sura bicolor*, *S. xylocopiformis*); Dalla Torre, Strand, 1925: 151 (*Sura bicolor*, *S. xylocopiformis*); Gaede, 1929: 532 (*Sura bicolor*, 533, pl. 77, row h (*Sura xylocopiformis*); Heppner, Duckworth, 1981: 25 (*Sura bicolor*, *S. xylocopiformis*); Vari *et al.*, 2002:



**Figs 5–7.** Genitalia of *Sura xylocopiformis* Walker, 1856. Male. Genitalia preparation No OG-018-2024: 5 — ventral view; 6 — saccus; 7 — aedeagus. Scale bar 0.5 mm.

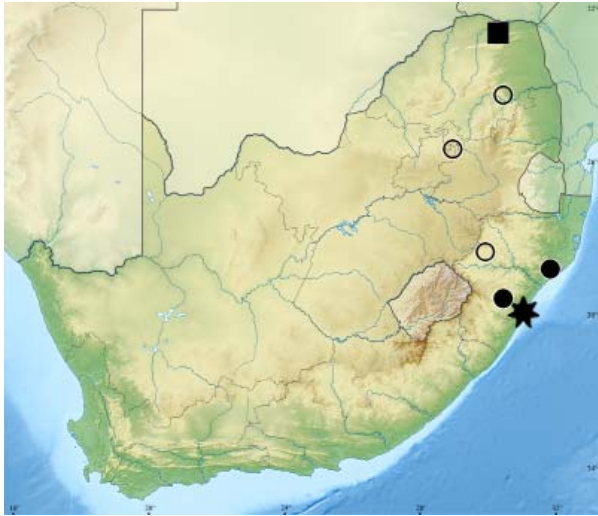
**Рис. 5–7.** Гениталии *Sura xylocopiformis* Walker, 1856. Самец. Препарат гениталий № OG-018-2024: 5 — вид снизу; 6 — саккус; 7 — эдеагус. Масштаб 0,5 мм.





**Figs 8–9.** Habitats of *Sura xylocopiformis* Walker, 1856. 8 — Republic of South Africa, KwaZulu-Natal Prov., Cumberland National Reserve, 22.XI.2021. Photo by R. Yakovlev; 9 — Republic of South Africa, KwaZulu-Natal Prov., oNgoye Forest Reserve, 24.XI.2021. Photo by R. Yakovlev.  
**Рис. 8–9.** Места обитания *Sura xylocopiformis* Walker, 1856. 8 — Южно-Африканская Республика, пров. Квазулу-Натал, Заказник Камберленд, 22.XI.2021. Фото Р. Яковлева; 9 — Южно-Африканская Республика, пров. Квазулу-Натал, Заповедник Онгое, 24.XI.2021. Фото Р. Яковлева.





**Fig. 10.** Distribution of *Sura xylocopiformis* Walker, 1856. Black star — type locality; black square — type locality of *Sura bicolor* Le Cerf, 1917; black circle — data from literature; black dot — collected material.

**Рис. 10.** Распространение *Sura xylocopiformis* Walker, 1856. Чёрная звезда — типовое местонахождение; чёрный квадрат — типовое местонахождение *Sura bicolor* Le Cerf, 1917; чёрный кружок — данные из литературы; чёрная точка — собранный материал.

67 (*Sura bicolor*, *S. xylocopiformis*); Pühringer, Kallies, 2004: 22 (*Sura bicolor*, *S. xylocopiformis*); Bartsch, 2008: 277, Fig. 13–15, 24, 37, 39, 44 (*Sura xylocopiformis*); Arita *et al.*, 2021: 32, 156, figs 334a–d (*Sura bicolor*); Pühringer, Kallies, 2024 (*Sura xylocopiformis*); De Prins, De Prins, 2011–2024 (*Sura xylocopiformis*).

**MATERIAL.** 4 ♂♂ (Figs 1–3): Republic of South Africa, KwaZulu-Natal Prov., Cumberland National Reserve, 29°30'33" S, 30°30'32" E, 610 m, 22.XI.2021, R. Yakovlev leg., Sesiidae pictures Nos 0079-0086–2024, 1 ♂ with genitalia preparations Nos OG–018-2024 (CAIC, COGM); 1 ♂: Republic of South Africa, KwaZulu-Natal Prov., oNgoye Forest Reserve, 28°50'55" S, 31°44'16" E, 260 m, 24–25. XI.2021, R. Yakovlev leg., Sesiidae pictures Nos 0087-0088–2024 (CAIC).

**REDESCRIPTION.** **Male** (Figs 1–2). Alar expanse 31.8 mm; body length 16.9 mm; forewing length 14.7 mm; antenna length 6.8 mm.

**Head:** antenna black with bright blue-violet sheen; scapus black with dark blue sheen dorsally and green sheen ventrally; frons black with anthracite sheen; labial palpus black with anthracite sheen and with individual white scales ventrally on both middle and apical palpomeres; proboscis long, light brown, well-developed; vertex covered with black hair-like scales with anthracite sheen; pericephalic hairs black with few white scales dorsally; neck plate black with anthracite sheen and few silvery-white scales ventrally.

**Thorax:** patagia black with anthracite sheen and few silvery-white scales laterally; tegula, meso- and metathorax black with bright blue-violet sheen; thorax laterally black with bright violet sheen; thorax posteriorly black with bright violet sheen densely covered with long black hair-like scales.

**Legs:** all coxae and femora black with bright violet sheen; all tibiae and tarsi black with bronze-violet sheen; all spurs black with bronze-violet sheen externally and silvery-white internally.

**Forewing:** completely opaque; dorsally black with bright greenish sheen, ventrally black with bright greenish-violet sheen; cilia black with dark blue sheen.

**Hindwing:** opaque but with two short transparent cells between veins R and CuP basally; dorsally black with bright greenish-blue sheen, ventrally black with bright greenish-violet sheen; cilia black with dark blue sheen.

**Abdomen:** completely black with bright greenish-blue sheen; anal tuft small, black with dark violet sheen.

**Male genitalia** (genital preparation No OG–018-2024) (Figs 5–7). Uncus narrow, slightly broadened distally, densely covered with flat scales in distal part; tegumen short; gnathos narrow, with single wide tooth; tuba analis with subscaphium narrowly well-sclerotized (Fig. 5); valva (Fig. 5) oval, margins broadly and densely covered with simple hair-like setae, with small oval field of dense bristle-like setae at ventral margin basally and densely oval group of thickened, multifurcate scales at dorsal margin basally, medially with few simple hair-like setae; saccus (Fig. 6) slightly shorter than vinculum, straight, narrow, somewhat pointed basally; aedeagus (Fig. 7) rather broad, about as long as valva, slightly bisinuate; vesica with numerous rows of minute cornuti.

**Female** (Fig. 4). Unknown to us, but a fairly informative diagnosis of external morphology is given in the original description of the female holotype [Walker, 1856], but indicated as a male [Bartsch, 2008]. The female genitalia remain unexplored.

**INDIVIDUAL VARIABILITY.** Unknown for female. The bright metallic sheen of the forewing dorsally varies from dark blue to greenish-violet. Two males have patagia with an admixture of white scales anteriorly, and one male (Fig. 3) has on the hindwing an additional transparent cell between vein CuP and the anal margin. The main dimensions vary as follows: alar expanse: 29.5–31.8 mm; body length 16.9–19.0 mm; forewing 13.8–15.0; antenna 6.2–7.2 mm.

**DIFFERENTIAL DIAGNOSIS.** Superficially, *Sura xylocopiformis* seems to be the closest to *S. ellenbergeri* (Le Cerf, 1917) (type locality: ‘... Lambarené (Ogououé). Congo français; ...’ [= Gabon: Moyen-Ogooué Prov., Lambaréné]) and *S. melanochalcia* (Le Cerf, 1917) (type locality: ‘... Mozambique, vallée du Pungoué, Guengère; ...’ [= Mozambique: Sofala Prov., Nhamatanda Distr., Pungwe River valley]), but it can be easily distinguished by the structure of the hindwing (completely opaque in the species compared, *vs.* with two or three transparent cells basally between veins R and CuP and anal margin in *S. xylocopiformis*; compare Figs 1, 3, 4 in the present publication with figs 16 and 19 in Bartsch, 2008 or with corresponding figs in De Prins, De Prins, 2011–2024). From *S. ruficauda* (Rothschild, 1911) (type locality: ‘... Ukami, German East Africa, ...’ [= Tanzania: Iringa Region, Kilolo Distr.]), *S. pyrocera* Hampson, 1919 (type locality: ‘Br. C. Africa, Ruo Valley ...’ [= Malawi: Mulanje Distr., Ruo River Valley]) and *S. ruftibia* Hampson, 1919 (type locality: ‘N. Nigeria, Baro ...’ [= Federal Republic of Nigeria: Niger State, Baro]), *S. xylocopiformis* clearly differs also in the structure of the hindwing, most of the surface of which is transparent; compare Figs 1, 3, 4 in the present article with figs 21, 20 and 22 in Bartsch, 2008 or with corresponding figs in De Prins, De Prins, 2011–2024.

**BIONOMICS.** The larval host plant is unknown. The males were attracted by unspecific artificial sex pheromones. The studied specimens were collected at the end of November.

**HABITAT.** Specimens from the Cumberland National Reserve were collected in a polydominant savannah (Fig. 8), and a single male from the oNgoye Forest Reserve was collected in a polydominant forest (Fig. 9).

**DISTRIBUTION** (Fig. 10). Currently this species is only known from Provinces KwaZulu-Natal, Gauteng, and Lim-

popo in the eastern part of the Republic of South Africa. However, in the KwaZulu-Natal Province, material was collected from two new localities.

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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).

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