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Article

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Rugigegat lucyvoronovae sp. n. (Lepidoptera, Cossidae, Zeuzerinae) from Northern India with world catalogue of the Genus

ROMAN V. YAKOVLEV[1,2] & ANTON KOZLOV[3]

[1]*Altai State University, Lenina pr. 61, Barnaul, 656049, Russia.*
E-mail: yakovlev_asu@mail.ru; https://orcid.org/0000-0001-9512-8709
[2] *Tomsk State University, Lenina pr. 36, 634050, Tomsk, Russia.*
[3] *Tsyurupy str., 13, Moscow, 117418, Russia.*
E-mail: kant.klintsy@gmail.com; https://orcid.org/0000-0002-6002-4261

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Abstract
The article describes *Rugigegat lucyvoronovae* Yakovlev & Kozlov sp. nov. (Lepidoptera, Cossidae, Zeuzerinae) distributed in the Northern India (Sikhim). The article has nine illustrations. The new species is most close to *R. radzha* Yakovlev, 2022, from which is differs in a series of characters. In contrast to the new species, the mottled portion on the anal margin of the fore wing in *R. radzha* does not reach the anal angle of the wing, the gnathos arms are significantly shorter, the valve is noticeably narrowing basally. The world catalog of the genus *Rugigegat* Schoorl, 1990 is presented. For the first time, we give the description and images of the male and female genitalia of *R. nigra*. We provide the data on the endemics of the superfamily Cossoidea in the Western Ghats − Sri Lanka and Eastern Himalaya biodiversity hotspots.

Key words: biodiversity, species richness, Cossoidea, Cossidae, Metarbelidae, Ratardidae, Paleotropics, Western Ghats−Sri Lanka biodiversity hotspot, Eastern Himalaya biodiversity hotspot. taxonomy.

Introduction

The genus *Rugigegat* (Lepidoptera, Cossidae, Zeuzerinae) was established by Schoorl (1990) for the specific species *Zeuzera nigra* Moore, 1877 (by original designation), characterized by the pronounced sexual dimorphism and the semi-transparent zones on the fore and hind wings. Currently, there are two known species of this genus: *R. nigra* (Moore, 1877) distributed in Sri Lanka and *R. radzha* Yakovlev, 2009 distributed in Southern India. During the examination of materials on Cossoidea, obtained from the Southern Asia, a species new to science has been found. Its description and diagnosis is provided below.

Material and methods

Male genitalia was mounted in euparal on slides following Lafontaine and Mikkola (1987) and examined

with an Olympus SZX16 microscope. The images were taken with the digital camera CMOS 20.7 megapixels and processed using Corel Photo-Paint 2017 software. The morphological terminology follows Kristensen (2003).

Abbreviations of Museums

MWM Museum of Thomas Witt (Munich, Germany) – nowadays a part of ZSM since 2020;
NHMUK National Museum of Natural History (formerly: The Natural History Museum, London, U.K.);
ZISP Zoological Institute of Russian Academy of Science (St. Petersburg, Russia);
ZSM Zoologische Staatssammlung der Bayerischen Staaten (Munich, Germany).

Taxonomical part

Description of new species

Rugigegat lucyvoronovae Yakovlev & Kozlov, **sp. n.**
https://zoobank.org/urn:lsid:zoobank.org:act:6108F352-B10F-46C6-9B86-D853379C44FE
Figs 1, 6

Material. Holotype (male), India, Sikhim [Sikkim], 2200−3000 m, 7.vii.2003, leg. I.A. Sergeev (slide Prozorov 2023-0576; ZISP).

Description. Male (Fig. 1). Length of fore wing 11 mm. Antennae short, light-orange; proximal half bipectinate, distal half simple (filiform). Head, thorax and abdomen densely covered with black scales. Fore wing narrow, apically sharp, semi-transparent, with sputtering of rare black and ocher scales, narrow mottled field along costal margin (with alternating black and ocher portions), wide mottled area along anal margin, slight sputtering of ocher scales at veins; fringe mottled (dark at veins and ocher between veins). Hind wings short, apex slightly pulled out, semi-transparent, with sputtering of rare black and ocher scales, narrow creamy portion along costal margin, extended black opaque portion at anal margin. Fringe creamy, at black opaque portion – black.

Male genitalia (Fig. 6). Uncus tapered, slightly narrowing from base to apex, apically semicircular; tegumen trapezoidal; gnathos arms thin, long, not fused; gnathos reduced; valve leaf-like with almost even edges, without harpes; juxta semicircular, saddle-like with pair of leaf-like lateral processes of medium length; saccus semicircular, of medium size; phallus slightly shorter than valve, thick, poorly curved in medium third, vesica with large finger-like cornutus (cornutus twice shorter than valve).

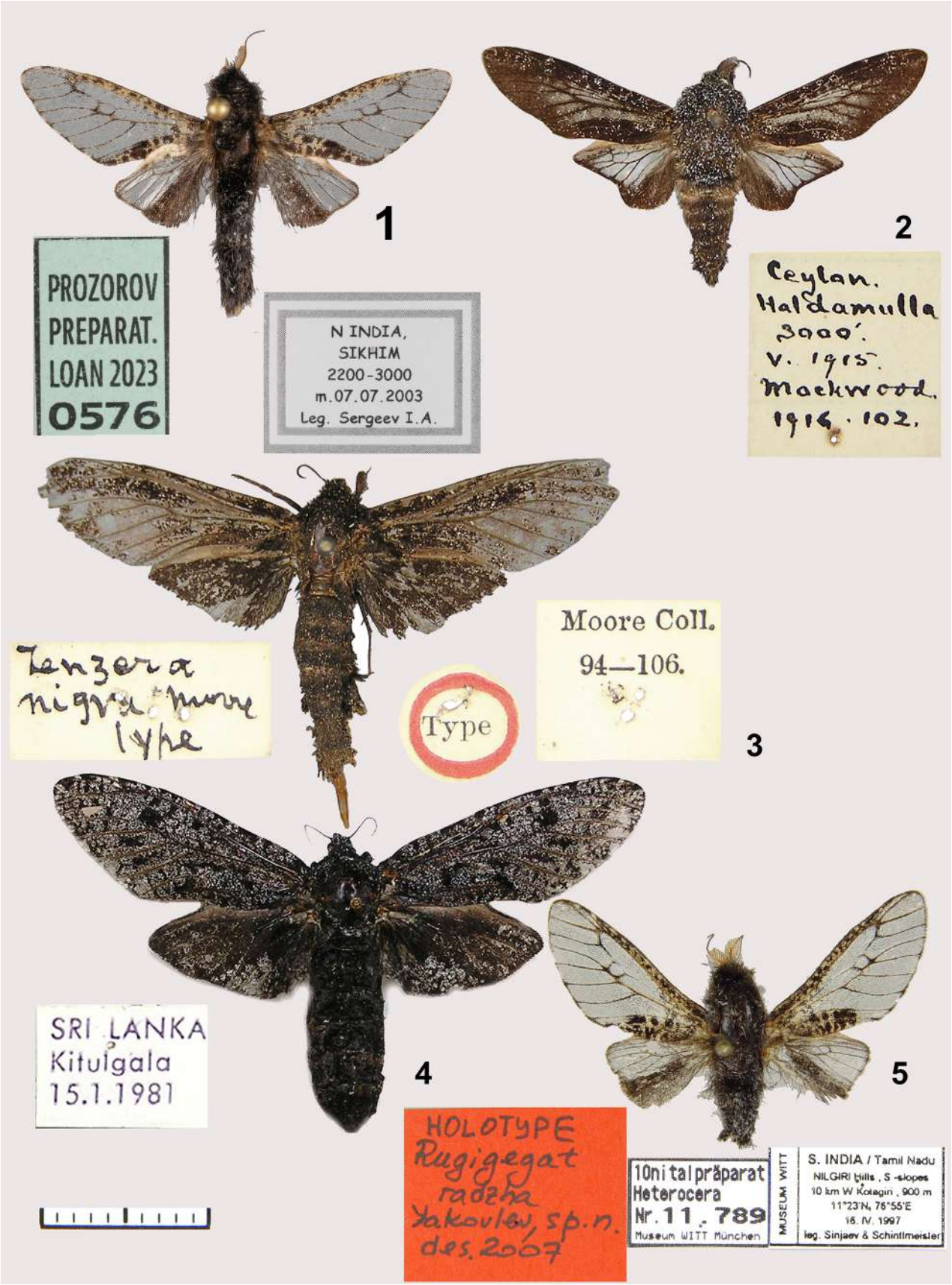
Female unknown.

Diagnosis. Externally, clearly differs from *R. nigra*, which has only a small semi-transparent portion in the middle of the fore wing, this portion is framed in a wide black border, there are also significant differences in the male genital structure – in *R. nigra* the valve is apically acute, the phallus is very big, slightly longer than valve. Externally, the new species is most close to the recently described species, *R. radzha* (distributed in Southern India), from which it differs in the following characters: the mottled portion on the anal margin of the fore wing in *R. radzha* does not reach the anal angle of the wing, the gnathos arms are significantly shorter, the valve is noticeably narrowing basally.

Etymology. The new species named after the well-known original Russian painter Lucy Voronova (Lyudmila Vladimirovna Voronova, 15.12.1953). The name is dedicated to the release of the anniversary catalog which is timed to the 70th anniversary of the painter.

Distribution. NE India, Sikkim.

Flight period. July.



Figures 1−5. Adult specimens of *Rugigegat*: 1. *R. lucyvoronovae*, sp. n.**,** male, Holotype (ZISP); 2. *R. nigra*, male, Ceylon, Haldamulla, 3000′, v.1915, Mackwood, 1916 – 02 (NHMUK); 3. *R. nigra*, female, Holotype, [Ceylon] (NHMUK); 4. *R. nigra*, female, Sri Lanka, Kitulgala, 15.i.1981 (private collection of Armin Hauenstein, Untermünkheim, Germany); 5. *R. radzha*, male, Holotype (MWM/ZSM). Scale bar = 10 mm.

Figures 5−7. Genitalia of *Rugigegat*: 6. *R. lucyvoronovae*, sp. n., male, Holotype (ZISP, slide Prozorov 2023-0576); 7. *R. nigra*, male, Ceylon, Haldamulla (slide Coss 327, NHMUK); 8. *R. nigra*, female, Ceylon, Holotype (slide Coss 326, NHMUK). Scale bar = 1 mm.

Catalogue of the Genus

Genus *Rugigegat* Schoorl, 1990
Zool. Verhand. 263: 139−140 (type species: *Zeuzera nigra* Moore, 1877, by original designation).
Composition: three species.
Distribution: South Asia (Hindustan and Sri Lanka) (Fig. 6).

Rugigegat lucyvoronovae Yakovlev & Kozlov, **sp. n.**
Figs 1, 6

Type material (Holotype, male) in ZISP, examined.

Distribution: NE India, Sikkim.

***Rugigegat nigra* (Moore, 1877)**
Figs 2−4, 7−8

Zeuzera nigra Moore, 1877: 348.
Type locality: Ceylon [Sri Lanka].
Type material (Holotype, female) in NHMUK, examined.

Description of male genitalia. Uncus tapered, apically rounded; gnathos arms thin, long, not fused; gnathos reduced; valve leaf-like costal edge uneven, abdominal edge almost smooth, apically acute; juxta saddle-like, with pair of leaf-like lateral processes; saccus semicircular, of medium size; phallus very big, thick, longer than valve, strongly curved on border between basal and medium thirds, vesica with robust cornutus which is about third of valve in length.

Description of female genitalia. Ovipositor very long, with transverse notching on lateral surfaces; anterior apophyses one third shorter than posterior apophyses; membranous portions of genitals absent on slide, probably due to the specimen being damaged by the collection pests.

Distribution: Sri Lanka (Cotes & Swinhoe 1887; Arora 1976; Yakovlev 2011). Host plants: *Coffea arabica* (Rubiaceae) (Moore 1882−1883).

Notes. Reported by Gaede (1933) and Ahmad et al. (2023) for Nilgiri Hills, but this record refers to *R. radzha*.

***Rugigegat radzha* Yakovlev, 2009**
Fig. 5

Yakovlev, 2009: 355−356, fig. 8, pl. IV: 9.
Type locality: S. India, Tamil Nadu, Nilgiri Hills, S slope, 10 km W Kotagiri.
Type material (Holotype, male) in MWM, examined.

Distribution: S. India, Tamil Nadu Province.

Discussion

All the three species of the genus *Rugigegat* are endemics for the Western Ghats−Sri Lanka and Eastern Himalaya, united into "biodiversity hotspots" (Myers 1988; Myers *et al.* 2000) (Fig. 8). For Western Ghats−Sri Lanka biodiversity hotspot, there are two known endemic genera of Cossoidea: *Ghatarbela* Yakovlev & Zolotuhin, 2021 (type species: *Ghatarbela bifidunca* Yakovlev & Zolotuhin, 2021, by original

designation), *Micrarbela* Yakovlev & Zolotuhin, 2021 (type species: *Arbela minima* Hampson, 1910, by original designation) and thirteen endemic species: *Roepkiella nigromaculata* (Hampson, 1892), *Phragmacossia brahmana* Yakovlev, 2009, *P. dudgeoni* (Arora, 1974), *Phragmataecia minima* Hampson, 1891, *Rugigegat nigra* (Moore, 1877), *R. radzha* Yakovlev, 2009, *Xyleutes ramamurthyi* Yakovlev & Sankararaman, 2021 (Cossidae), *Encaumaptera stigmata* (Hampson, 1891), *Ghatarbela bifidunca* Yakovlev & Zolotuhin, 2021, *Stueningeria campbelli* (Hampson, 1910), *Tagoriana watsoni* (Hampson, 1900), and *Micrarbela minima* (Hampson, 1910) (Metarbelidae). For Eastern Himalaya biodiversity hotspot, twelve endemic species of Cossoidea are reported: *Catopta sikkimensis* (Arora, 1965), *Patoptoformis hanuman* Yakovlev, 2006, *Patoptoformis ganesha* (Yakovlev, 2004), *Panau bretschneideri* Yakovlev, 2013, *Phragmataecia annapurna* Yakovlev, 2009, *P. laszloi* Yakovlev, 2009, *Rugigegat lucyvoronovae, Orientozeuzera shiva* Yakovlev, 2011, *Zeuzera nepalense* Daniel, 1962, *Sansara pallidalae* (Hampson, 1892), *S. dea* (Yakovlev, 2006) (Cossidae), and *Stueningeria nepalensis* Lehmann, 2019 (Metarbelidae), *Ratarda furvivestita* Hampson, 1905 (Ratardidae) (Yakovlev 2015, 2018; Yakovlev & Zolotuhin 2020, 2021; Yakovlev et al. 2021).

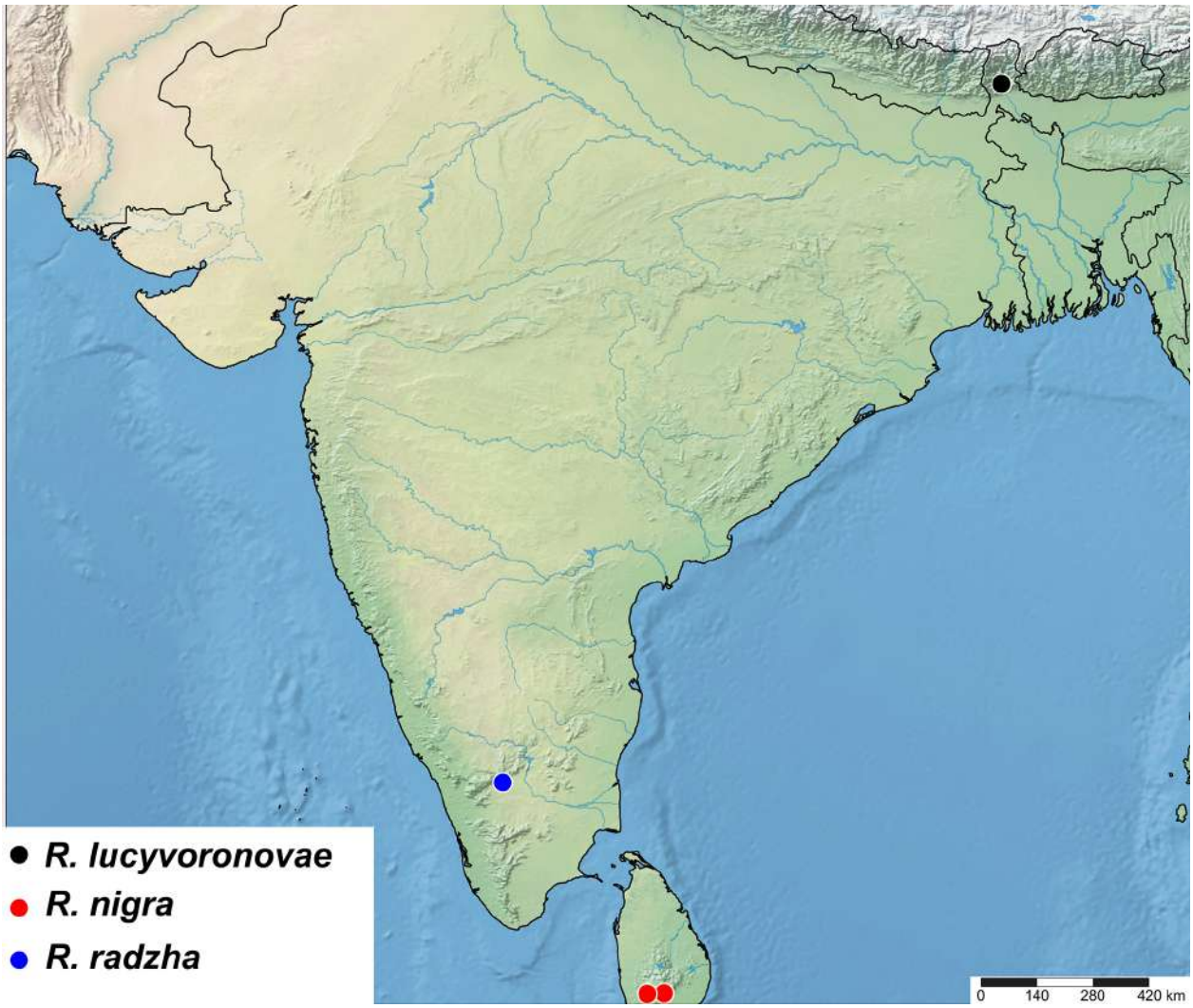


Figure 9. Distributional map of *Rugigegat.*

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