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Cover Photo by Peter Smetacek of a *Salassa mizorama* Moth

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NOTES ON TAXA OF THE SALASSA LEMAII GROUP (LEPIDOPTERA: SATURNIIDAE) WITH THE DESCRIPTION OF A NEW SPECIES FROM MIZORAM, INDIA

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Keywords: Mizoram, Saturniidae, *Salassa*, new species.

Abstract

A new species of the genus *Salassa* Moore, 1859 (Lepidoptera, Saturniidae, Salassinae) is described from Mizoram in north-eastern India: *Salassa mizorama*, n. sp. It is compared with its closest relatives in the genus, the species around *Salassa lemii* Le Moul, 1933. So far, the new species is known only from males; females and preimaginal instars remain unknown. An overview about the group is given, and one recently described subspecies, *Salassa lemii Chiangmaiensis* Brechlin & Meister, 2009 is synonymized with its nominotypical species. Some shorter general notes on the genus *Salassa* are given, to clarify some taxonomic problems. *Salassa kitchingi* Brechlin, 2010, is found to be a synonym of the long-known sub-Himalayan species *Salassa lola* Westwood, 1847 whose type locality was wrongly interpreted.

Introduction

The first specimen of a species of the *Salassa lemii*-group was collected in November 2011 by Lalawmpuia, then a research assistant at Mizoram University, Aizawl, Mizoram, India at Electric Veng, Aizawl. This specimen was in the collection of the Mizoram University, Aizawl, but has since been misplaced. In the same month and year, another specimen was collected in Hmuifang, Aizawl district, Mizoram, by the junior author. In late October and early November 2019, 26 further specimens were obtained from Hmuifang and deposited in the collection of the Butterfly

Research Centre, Bhihtal, Uttarakhand and the Department of Zoology, Mizoram University (Central), Aizawl. Due to overall differences in morphology and DNA barcoding results, it was decided to make a name for it available to science.

Salassa mizorama, n. sp.

Holotype (Fig. 1, dorsal view; Fig. 2: ventral view): Male, India, Mizoram, Aizawl District, Hmuifang, 23°27'01''N 92°45'26''E, 1472 m, 3.xi.2019, 1.00h IST, leg. P. Smetacek, in the collection of Butterfly Research Centre, Bhihtal, Uttarakhand, bearing a red holotype label.

Paratypes: 18 males, same locality as holotype, all collected between 30.x. – 4.xi.2019, 1 male with genitalia no. 2618/19 Naumann, barcode SNB-RR 0263, leg. P. Smetacek, in Butterfly Research Centre, Bhihtal, Uttarakhand; 7 males, same locality as holotype, all collected between 1.xi. – 4.xi.2019, leg. Lalngahpuii, MZUEC 20190001 – MZUEC 20190007, in collections of Entomological Collections, Systematics and Toxicology Laboratory, Department of Zoology, Mizoram University, Aizawl, Mizoram; 1 male, India, Mizoram, Aizawl District, Hmuifang, 23°27'04.07''N 92°45'19.41''E, 7.xi.2011, barcode KJ624750, leg. E. Lalhmingliani, MZUEC 20110001, in collections of Entomological Collections, Systematics and Toxicology Laboratory, Department of Zoology, Mizoram University, Aizawl, Mizoram (figured in

Lalhmingliani 2015: 50, fig. 5E, as *S. lemaiti*). Blue paratype labels will be added.

Etymology: The species is named for Mizoram, India, the only known state where this moth is found. Mizo is the name of the native inhabitants and Ram means land, so Mizoram means Land of the Mizos.

Description

Male: Length of forewing, measured from base to apex, 93 – 107 mm (holotype 97 mm). Head, thorax, abdomen and wings with ground colour olive suffused with fuscous scales, the complete body covered with hair-like scales; the tegulae clothed with long, white and olive hair-like scales. Base of antennae whitish, antennae quadripectinate, last five segments bipectinate, 19 – 21 mm in length, 43 segments, longest rami 1.7 mm.

Forewing elongate, with apex somewhat produced and rounded tornus. A narrow white subbasal line, originating on the costa and ending at the base of the forewing termen, where it coincides with a white band across the thorax; an ovoid, greenish-hyaline discal ocellus of 9 – 12 mm (holotype 10 mm) maximum diameter, with an inner black, middle bluish-white and outer brown ring. Postmedial fuscous band straight, with costal part whitish and 6 small hyaline fenestrae between the veins. Postmedian area less suffused with fuscous scales, the subapical and apical areas suffused with whitish scales; this area is at least 10 mm between the postmedial band the submarginal fuscous zigzag band beyond which is an orange marginal area. Cilia orange and fuscous.

Hindwing with a greenish-hyaline, discal, almost round ocellus, of 8 – 10 mm maximum diameter (holotype 9 mm), defined by an inner black, middle bluish-white and outer brown ring, and surrounded by a vivid orange ring which is narrower towards the base of the wing; some orange suffusion between the orange ring and the postmedial fuscous line, which originates on the termen, with six hyaline fenestrae between the veins. In the upper half of the wing, the postmedial line

merges into a prominent black semi-circular mark encircling the upper half of the discal ocellus. Postmedian area again in ground colour, with a pair of fuscous, irregular zigzag lines, the outer one widening towards the apex.

On ventral side thorax and abdomen covered with long, dark brown hair, the last abdominal segment grey. Fore legs on dorsal side brown, on ventral side light grey, the two other pairs of legs completely light grey. Wing undersides greyish brown, forewing discal ocellus with only a narrow black and bluish-white ring on basal side while the hindwing ocellus has a complete black and bluish-white ring defining it. Postmedian band of fenestrae outwardly suffused with greenish scales, beyond which the groundcolour is suffused with whitish scales. Submarginal and marginal areas dark brown with patches of orange scales between the veins.

Distinctive characters: The combination of characters (size and form of discal ocelli, orange area around the hindwing ocellus which extends to the postmedian line, the number of fenestrae in the postmedian line, the wide distance between the postmedian and marginal lines on the forewing, the prominent black mark on the upper part of the hindwing postmedian line, and a single prominent marginal band on the hindwing [all other species have two prominent bands]) make *S. mizorama* easy to separate from other known species in the group.

Male genitalia: Uncus with a dorsal “hyperuncus”, the uncus itself bent in ventral direction and ending with a 1 mm broad edge. Transtilla with two lateral round protuberances. Dorsal process of the valvae with double tips, the dorsal one rounded, the ventral one more acute; the ventral process of the valvae with two acute tips. Saccus broad and rounded, juxta with two lateral, short and acute processes. Phallus 5.5 mm long, vesica emerging to dorsal side with one rounded bulb of around 1 mm diameter.

The male genitalia of the nearest relative, *S. lemaiti* are similar in their general structure, but differ from those of *S. mizorama* by a more acute tip of the uncus, smaller and more blunt dorsal and ventral processes of the valves, the ventral one without indentation between the two processes, a more rounded saccus, and a juxta with lateral lobe-like processes in addition to a central knob-like protuberance. Phallus shape and size in general are similar.

So far the species is known only from adult males; females and preimaginal stages are unknown. All males were collected within a relatively short time period between 23.55 and 1.20 hrs Indian Standard Time, after this time no specimens approached the light traps.

The type locality is dominated by *Rapanea capitellata*, *Eurya* sp., *Quercus* spp., *Elaeocarpus rugosus*, *Nyssa javanica*, *Macropanax* sp., *Schima wallichii* and *Ardisia macrocarpa*. In addition, there are grassy ridges and hillsides above the forested valleys and ravines. According to Champion & Seth (1968) the area falls under their Montane Subtropical Forest category.

Taxonomic notes on other members of the *S. lemaiti* group

With the description of *S. mizorama*, the number of species in the *S. lemaiti* group is raised to four. All species are active in the cold season around late October to early December and inhabit areas with pristine primary forests at medium to high elevation between 950 m to almost 2000 m.

***S. lemaiti lemaiti* Le Moulton, 1933**

S. lemaiti chiangmaiensis Brechlin & Meister, 2009 **syn. nov.**:

S. lemaiti chiangmaiensis was described from what appeared to be an isolated population of *S. lemaiti* in northern Thailand, whose nominotypical form is known from northern Vietnam. Gaps in the known distribution of *S. lemaiti lemaiti* whose type locality is Northern Vietnam and *S. lemaiti chiangmaiensis* from Northern Thailand, as mentioned by Zhang & Kohll (2008), are probably due mainly to the lack of surveys during the cold season and

secondly, to the lack of primary forests in the intervening area; future surveys in Northern Laos should most probably result in the discovery of connecting populations.

In a series of specimens comprising 3 males and 3 females from northern Vietnam and 10 males and 1 female from northern Thailand in Collection Naumann, no stable differences could be found between the different populations. Thai specimens examined were from Doi Inthanon and Doi Pha Hom Pok, Chiang Mai Province, at around 2000 m altitude, on the Myanmar border, a so far unknown locality for the species: the differences between Vietnamese and Thai populations mentioned in Brechlin & Meister (2009) for the form of the forewing apex (caveat: The female holotype of *S. lemaiti lemaiti* has repaired and partly trimmed forewings), the curves of the white forewing basal line and the number and size of hyaline patches along the postmedial line (in females in Collection Naumann, only seven hyaline patches in both populations) are not visible, and even the size of specimens seems not to be significant as the smallest male from Thailand has a forewing length of only 91 mm and therefore is smaller than all known male specimens from the type locality in Northern Vietnam. The only difference between both populations seems to be the size of the discal ocellus, which is slightly larger in male and female specimens from Thailand. No differences in male genitalia between both populations could be observed (genitalia no. 2425/15 from N. Vietnam, no. 1389/06 from Thailand). These morphological observations concur with the results of systematic barcoding where both populations show no differences. Based on the above points, *S. lemaiti chiangmaiensis* Brechlin & Meister, 2009, **syn. nov.**, is herewith synonymised with its nominotypical taxon.

Perhaps the type series of *S. l. chiangmaiensis* was too small to distinguish any stable specific or subspecific characters; interestingly, the third female mentioned from the Natural

History Museum, London in the original description is, in fact, a male, so the few measurements for females also contain data for a male.

***S. siriae* Brechlin & van Schayck, 2015**

Specimens of this taxon were only known from the type locality in Da Nang province in Central Vietnam. Meanwhile, specimens have been recorded from Quang Ngai Province in Central Vietnam and Lam Dong Province in Southern Vietnam (specimens in Collection Naumann), therefore

this taxon has a wider distribution than known before.

Checklist of the group around *Salassa lemaiti*:

Salassa lemaiti Le Moul, 1933; Locus typicus: Vietnam (N), Tam Dao; BIN Code on BOLD: AAC8986.

S. lemaiti chiangmaiensis Brechlin & Meister, 2009, **syn. nov.**; Locus typicus: Thailand (N), Chiangmai Prov., Doi Inthanon N.P.

Salassa shuyiae Zhang & Kohll, 2009; Locus typicus: P.R. China, Hainan Island, Ledong Co.; BIN Code on BOLD: ABY9933.

Salassa siriae Brechlin & van Schayck, 2015; Locus typicus: Vietnam (C/E), Da Nang Prov., Ba Na Mts.; BIN Code on BOLD: ACI5793.

Salassa mizorama Naumann & Lahlmingliani **n. sp.**; Locus typicus: India, Mizoram, Hmuifang; BIN Code on BOLD: ACQ7929.

***Salassa lola* Westwood, 1847**

Salassa kitchingi Brechlin, 2010 **syn. nov.**

S. kitchingi Brechlin, 2010, described from Nepal, fits in all details with typical specimens of *S. lola* Westwood, 1847. Although the latter was mentioned by Westwood (1847: 25) to originate from Sylhet, it appears that this is an impossible provenance of that taxon; the highest elevation in Sylhet District in north-eastern Bangladesh is less than 100 m above sea level, an altitude at which no *Salassa* species has ever subsequently been recorded. Entomological specimens sent to Europe in the mid-19th to early 20th century by British collectors based in India mainly originated from local people who collected not only in

N.E. India but even in Tibet and Myanmar. This matter was mentioned in an earlier paper on *Saturnia zuleika* Hope, 1843 (Naumann & Nässig, 2010) which we cite here:

“A similar case of an implausible type locality is that of *Salassa lola* (Westwood, 1847). Westwood (1847–48: 25) also indicates “Sylhet”, which was then repeated by Hampson (1893: 27) and, possibly as a result of this secondary source (because this looked like some kind of a “verification” of the locality data), was then translated into the present-day locality “Bangladesh” in a modern publication (Witt & Pugaev 2007: 3–4, in their lectotype designation for *S. lola*). *S. lola* is another typically Himalayan mountain species (and not even known to occur in the Khasi and Naga Hills at all!), living on average at even higher elevations than *Saturnia zuleika* s.l., and thus surely also does not inhabit lowlands, as has already been noted by Naumann *et al.* (2010: 116–117) — this is most likely another drastic case of an erroneous type locality in Saturniidae.”

Judging from the formerly used type localities of other British authors (e. g. Hope 1843, Westwood 1847, Moore 1872) in combination with knowledge of the distribution of specimens similar with the lectotype of *S. lola* we believe that the real type locality of that species should be somewhere in Darjeeling were the British in colonial times owned tea plantations and houses to stay during summer. With all this, we believe that *S. kitchingi* Brechlin, 2010, **syn. nov.**, is the same species as *S. lola*, described already about 160 years earlier.

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Fig.1: *Salassa mizorama* n. sp., male holotype, *recto*.



Fig.2: *Salassa mizorama* n. sp., male holotype, same specimen, *verso*



Fig.3: Male paratype *recto*



Fig.4: Male paratype *verso*

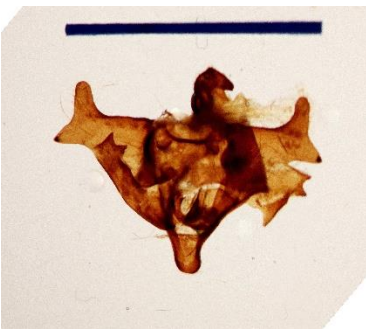


Fig.5: male genitalia of *S. mizorama* n. sp. paratype, genitalia no. 2618/19 Naumann (scale bar 10 mm).



Fig.6: *S. mizorama* male aedeagus, of same specimen.

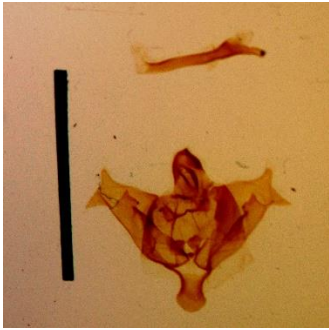


Fig.7: male genitalia of *S. lemai*, genitalia no. 1389/06 Naumann (scale bar



Fig.8: Habitat of *S. mizorama* **n. sp.** in Hmuifang, Mizoram, xi.2019.