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FIRST RECORD OF *CELAENORRHINUS PULOMAYA* (HESPERIIDAE) FOR NEPAL

PIET VAN DER POEL

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Reviewer: Peter Smetacek

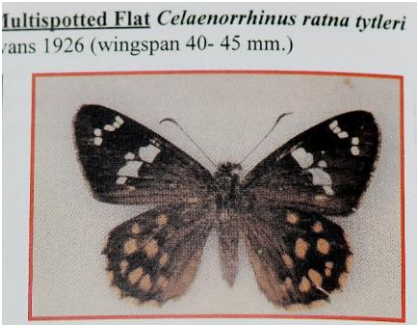
Celaenorrhinus pulomaya (Moore, [1866]) Multi-spotted Flat

Moore (1865) described *C. pulomaya* from Darjeeling as *Plesioneura pulomaya*. However, he did not indicate that the description was of a new species, and referred to "*Hesperia pulomaya*, Moore, Cat. Lep. E. I. C. i. p. 252", which appears to be Horsfield & Moore (1857/1858). This document had no description and no image of the species, did not indicate that it was a new species and referred to "Hesperia Pulomaya, *Moore, Proc. Zool. Soc. (ined.).*". The latter does not appear to be a published document by Moore, assuming it was published before or at about the same time as Horsfield & Moore (1857/1958). Van Gasse (2018) and Varshney & Smetacek (2015) reported *C. pulomaya* (Moore, [1866]) from Himachal Pradesh to N.E. India. Van Gasse (2018) also listed it from Bhutan, most probably based on Evans (1949). Van der Poel *et al*. (2023) reported recent evidence of it from Bhutan based on a 2012 picture. Van der Poel & Smetacek (2022) listed some 160 species that were not yet recorded from Nepal but were expected to be flying all across Nepal or in east or west Nepal. The first species on this list was *Celaenorrhinus pulomaya*, also indicated by Van Gasse (2018) as "doubtless" occurring in Nepal.

When checking the identification of species photographed during butterfly surveys in Astam, 15km N.W. of Pokhara, I came across a 2017 picture of a misidentified *Celaenorrhinus* species. It was *C. pyrrha* de Nicéville, 1889, which at the time had only been reported once from Eastern Bhutan, but was around the same time reported from central Nepal (KC, 2023). I wondered if there were any pictures of *C. pyrrha* among the pictures taken by Colin Smith to which I had access. I did not find any, but instead came across a 2009 picture labelled as *C. ratna* Fruhstorfer, 1909. However, it had the lower spot in space 1b considerably smaller than the upper spot. Hence, it appeared to be *C. pulomaya*. The identification was confirmed by Sajan KC.

The photograph of *C. pulomaya* was taken by Colin Smith on 14 September 2009 in Banthanti, below Ghorepani, in Kaski District of Gandaki Province in Central Nepal, at an elevation of 7,600 ft (2,320m). The individual was extracting nectar from a flower of the Himalayan Balsam (*Impatiens glandulifera*). As the site is located in the Annapurna Conservation Area, I looked up the record in the butterfly booklet for that area (Smith, 2011), which showed a picture of a pinned specimen of *C. pulomaya*. Unfortunately, the specimen appeared not to be present in the Kathmandu and Annapurna Natural History Museums. The specimen was also was not the 2009 Banthanti individual, and there are no details in the Annapurna Conservation Area booklet.

This record means that in Nepal *C. ratna tytleri* is now again restricted to the Godavari and Shivapuri areas in Kathmandu Valley (M.S Limbu, *pers. comm*. 2023). *C. pulomaya* is likely to be present in other parts of Nepal. The most recently reported number of butterfly species for Nepal was 692 (Van der Poel & Smetacek, 2022). Earlier in 2023, Peter Smetacek (*pers. comm*.) reported that *Delias lativitta* Leech, 1893 ssp. *nepalica* Katayama, 2017 was overlooked. Thus, this new first record raises the number of butterfly species reported from Nepal to 694.



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DIOSCOREA BULBIFERA L. (DIOSCOREACEAE) AS A NEW LARVAL HOST PLANT OF *TAGIADES MENAKA* (MOORE, [1866]) (INSECTA: LEPIDOPTERA: HESPERIIDAE)

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Reviewer: Peter Smetacek

ABSTRACT

Dioscorea bulbifera L. (Dioscoreaceae) is reported as a new larval host plant of *Tagiades menaka*.

Keywords: Larval host plant, life cycle, *Dioscorea*, *Tagiades menaka*, Hesperiidae, Sikkim, India.

INTRODUCTION

The presence and population of insect herbivores are shaped by the prevalence of host plants (Knops *et al*., 1999). Larval host plants play an important role in the lifecycle of butterflies, as caterpillars are usually herbivorous and often depend on a specific range of plants to meet their nutritional and chemical needs (Nitin *et al*., 2018). Karmakar *et al*. (2018) reported the larval host plants of northeastern Indian butterflies. Recent research has highlighted the diversity and spatial distribution of butterflies in the region, yet knowledge about their larval host plants and early life stages was scarce (Robinson *et al*., 2001).

Dioscorea bulbifera L. (Family: Dioscoreaceae) is a climber plant, commonly referred to as air yam, aerial yam, bitter yam, cheeky yam, potato yam, and parsnip yam. This traditional medicinal plant is indigenous to Asia, Northern Australia, the Americas, and tropical Africa (Kundu et al., 2021).

MATERIALS AND METHODS

An opportunistic field survey was conducted in DS's backyard garden at Ralak village, located at 27.427° N and 88.527° E, with an elevation of 1150 m above sea level, near Dzongu in the Mangan District of Sikkim, India. On 09.vii.2023, a female *Tagiades menaka* was observed laying 2-3 eggs on the stem and upper surface of a leaf of *Dioscorea bulbifera* L. Five days later, the orange-brownish eggs successfully hatched into pale greenish 1st instar larvae with black heads, which began to feed on the leaves

of the same plant. DS closely monitored the caterpillar during this period, noting its feeding and shelter patterns. He observed that after consuming the leaves, the caterpillar completely covered its body with them. DS collected a yellowish-brown, orange-colored bilobed-headed 5th instar larva and placed it in a plastic basket along with some leaves of the same plant. The caterpillar continued its life cycle by feeding on the leaves of *D. bulbifera*. After 25 days, the caterpillar transformed into a white-brownish pupa. Ten days after pupating, an adult *T. menaka* emerged from the chrysalis. The life history and larval host plants of this species in India have not been previously illustrated or recorded. The identification of the eclosed butterfly was based on Kehimkar (2016), and observations of immature stages were also made in the natural environment.

RESULT AND DISCUSSION

Tagiades menaka has been reported from Kashmir to North East India (Varshney & Smetacek, 2015). The host plant of *T. menaka* was observed to be *Dioscorea bulbifera*, which had not been recorded before. It took a total of 35 days to emerge as an adult butterfly from the egg stage. The life cycle and larval host plant of this species in India have not been illustrated or recorded to date. Possibly, this will be the first record of the larval host plant and illustration of the life cycle of *T. menaka*.

ACKNOWLEDGEMENT

The authors are very thankful to Mr. Brahmananda Patiri and Dr. Dawa Lhendup Lepcha for identifying the host plant.

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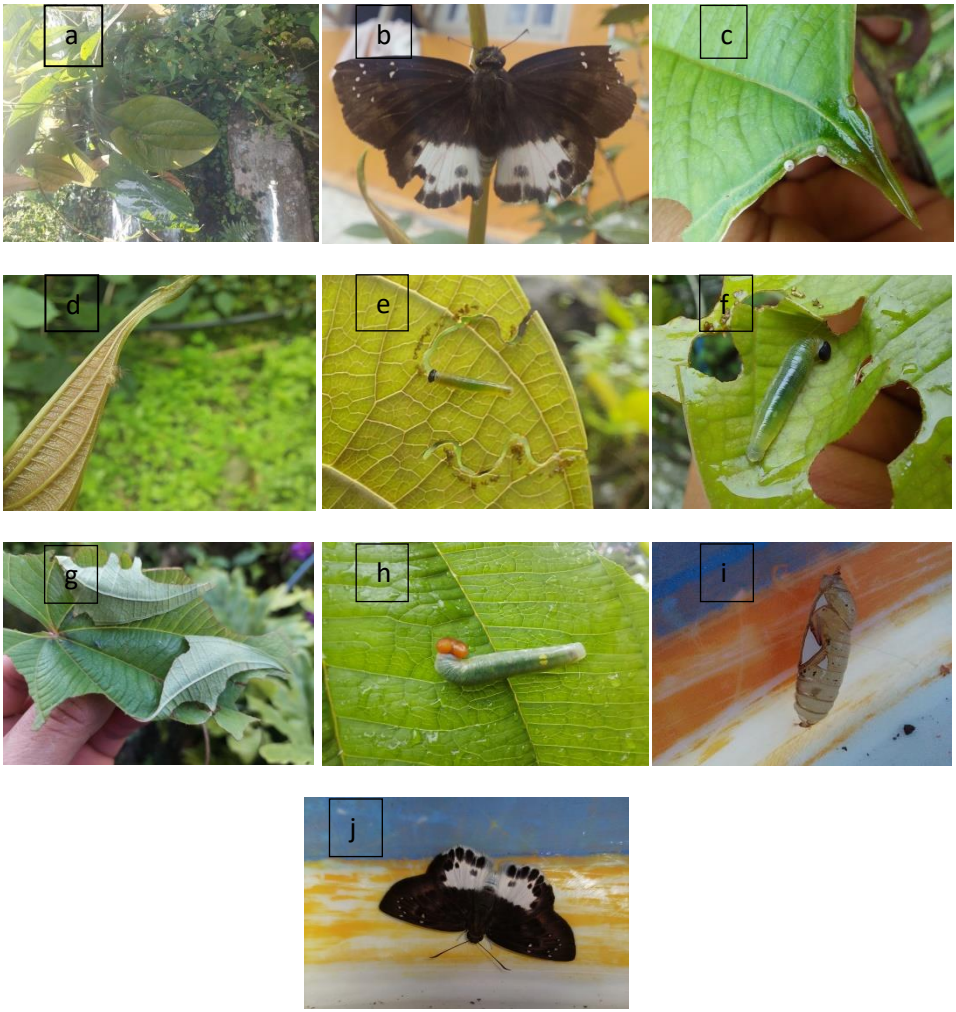
LEGENDS TO FIGURES

Figures: (a) Host plant *Dioscorea bulbifera* L., (b) *T. menaka* laying eggs, (c) Eggs of *T. menaka*, (d) Egg shells, (e) 1st instar larva, (f) 3rd instar larva, (g) Larva making leaf shelter, (h) 5th instar larva, (i) Pupa, (j) Freshly emerged adult *T. menaka*



CONFIRMATION OF *DICHROSTACHYS CINEREA* (L.) WIGHT & ARN. AS LARVAL HOST PLANT OF THE AFRICAN BABUL BLUE BUTTERFLY *AZANUS JESOUS* (GUÉRIN-MÉNEVILLE, 1849) (INSECTA: LEPIDOPTERA: LYCAENIDAE) IN INDIA

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The butterfly African Babul Blue (*Azanus jesous*) is distributed in Africa, Middle East, Pakistan, India, Sri Lanka, Bhutan and Myanmar (Larsen, 1986; Kehimkar, 2016; Williams, 2018). In India, *Azanus jesous* is found throughout the country except east of West Bengal (Varshney & Smetacek, 2015). It uses several plants of the family Fabaceae as larval host plants *viz*. *Adenopodia spicata*, *Dichrostachys* sp., *Entada* sp., *Medicago* sp., *Senegalia caffra*, and *Vachellia* sp. (Williams, 2018). *Vachellia farnesiana* and *Vachellia leucophloea* have been reported as larval host plant of *Azanus jesous* from India (Wynter-Blyth, 1957; Nitin, 2018). *Dichrostachys cinerea* has also been mentioned as larval host plant from India in a recent report (Theivaprakasham, 2020). This report however does not provide further details on the life cycle of *Azanus jesous* bred on *Dichrostachys cinerea*.

The present communication reports rearing of *Azanus jesous* on *Dichrostachys cinerea* (L.) Wight & Arn. (Fabaceae), confirming this plant as larval host plant of African Babul Blue butterfly in India.

A. jesous is commonly sighted ovipositing on naturally growing or planted *Dichrostachys cinerea* in hilly Aravalli areas of Delhi and its surroundings. The butterfly is a common sight in Aravalli Biodiversity Park, Gurugram, Haryana (an ecological restoration area adjacent to Delhi), which has several patches of *D. cinerea*. A freshly laid egg of *A. jesous* from the aforementioned location was reared under ambient temperature (minimum and maximum temperatures 11–20°C and 24–32°C, respectively) and variable humidity in the months of October–November, 2022. The egg hatched on the 6th day of ovipositing. The mature larva measuring about 8–10 mm in length, pupated 16 days after the hatching of the egg (Figure 1B–D). The pupa eclosed after 11 days of pupation (Figure 1E). The total duration of the life cycle of *A. jesous* was 33 days. The observed longer larval and pupal stages in the present study could be due to lower ambient temperature prevalent in the month of November.

The above observations confirm *Dichrostachys cinerea* as larval host plant of *Azanus jesous* in India.

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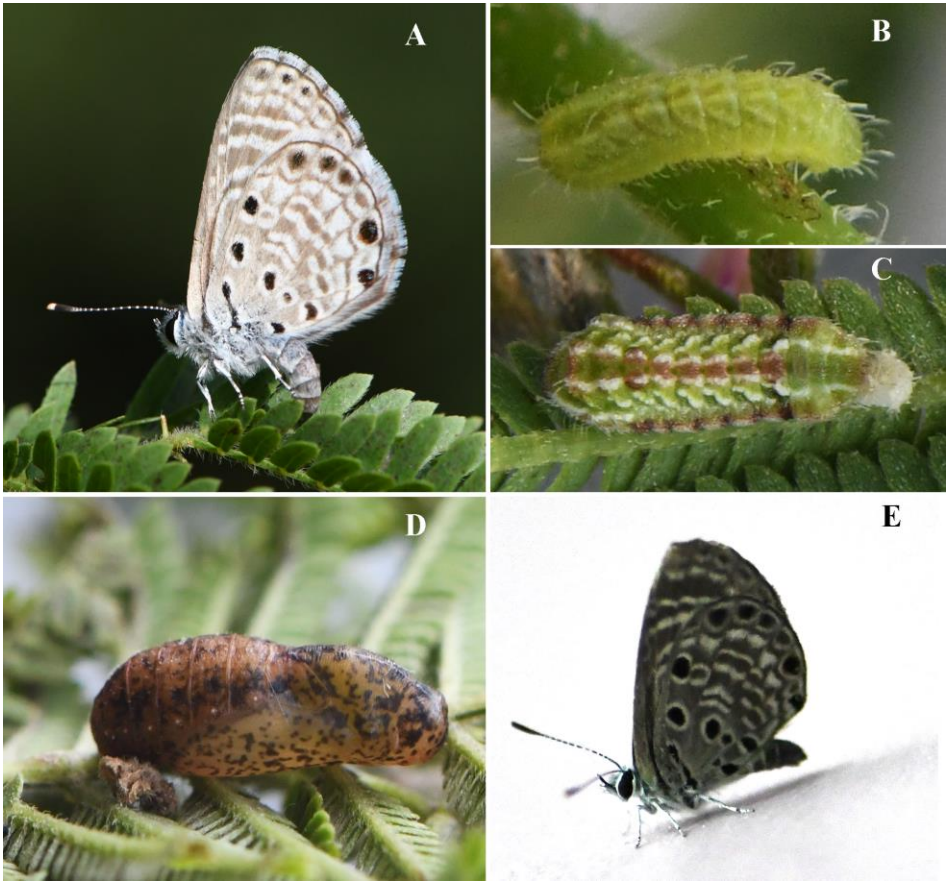

Figure 1: Oviposition by African Babul Blue on *D. cinerea* (A); larval stages (B–C); pupa (D); adult emerging from the pupa (E).

NOTES ON INDIAN SPECIES OF *PARERONIA* BINGHAM, 1907 (LEPIDOPTERA: PIERIDAE)

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Reviewer: Zdenek F. Fric

ABSTRACT

The overlooked homonymy of *Papilio hippia* Fabricius, 1787 in Indian literature is discussed, and *Pareronia anais* Lesson, 1837 is confirmed as the valid name for the species. We point out that the Andaman Island taxon *naraka* (Moore, 1877) was shown to be conspecific with *Pareronia anais* by Yata (1981); and the infrasubspecific status of *Pareronia avatar* form *tarina* Fruhstorfer (1903) is confirmed.

The genus *Pareronia* Bingham, 1907 currently includes 13 species distributed from India and Sri Lanka eastwards to Papua New Guinea (D'Abrera, 1977; Yata, 1981). Regarding the three species reported from the Indian subcontinent, it appears that several taxonomic updates published in extra-Indian literature have been overlooked by recent Indian authors (Varshney & Smetacek, 2015; Smetacek, [2016]; Kehimkar 2016; Bhakare & Ogale, 2018) and therefore we re-iterate the following observations:

1. *Pareronia anais* (Lesson, 1837)

This taxon was treated as *P. valeria hippia* in Evans (1932); Wynter-Blyth (1957), Varshney & Smetacek (2015). Yata (1981) showed that *P. valeria* was, in fact, restricted to an area from southern Myanmar, through the Malay Peninsula, Singapore to Sumatra, Borneo, Java to Flores and Palawan plus nearby islands. The Indian subcontinent is home to a different species, with a distribution restricted to the Asian mainland from northern India eastwards to Hainan, Guangdong and the northern part of W. Malaysia; for this, the name *hippia* (Fabricius, 1787) was available and used by subsequent Indian authors (Kehimkar, 2016). However, Eliot (1978) recognized that *Papilio hippia* Fabricius, 1787 is a junior primary homonym of *Papilio hippia* Cramer, 1779, which is now placed in the genus *Pseudonympha* Wallengren, 1857 (Nymphalidae) and is, therefore, permanently unavailable. Therefore, the name *anais* Lesson, 1837 is the valid name for the species found on the Indian

subcontinent and the valid combination is *Pareronia anais* as pointed out by Eliot (1978).

Corbet (1941) drew attention to the primary homonymy of *Papilio philomela* Linnaeus, 1763 (now placed in *Ypthima* Hübner, 1818) and *Papilio philomela* Fabricius, 1793, a name given to the yellowish female form of *Pareronia* which mimics *Parantica aspasia* (Fabricius, 1787). Eliot (1978) proposed the name *lutea* for this female form, which he placed in *P. anais*; however, examination of the type of *Papilio philomela* in the Banks Collection (NHM, London) showed it belongs to *Pareronia valeria*, and so *lutea* Eliot, 1978 is the yellow form of that species. Fruhstorfer (1903a) described ♀ ab. *livilla* from Vietnam, misunderstanding that *philomela* is the yellow female form of the same species from India. Thus, the yellow form of the female of *Pareronia anais* can be referred to as form *livilla* Fruhstorfer, 1903.

2. Varshney & Smetacek (2015) followed older authors (Bingham, 1907; Evans, 1932; Talbot, 1939) in treating the Andaman Island taxon *naraka* (Moore, 1877) under *P. ceylanica* (C. Felder & R. Felder, 1865). However, Yata (1981) had shown that this taxon properly belongs under *Pareronia anais* based on male genitalia. *Pareronia anais naraka* is the valid combination for this taxon.

3. Fruhstorfer (1903b) described a rather distinct dry season form of *Pareronia avatar* and named it *tarina*. In his own words (translated from German):

> 'The dry season form differs so considerably from typical *avatar* that I wish to bestow a name on it, for which the name *tarina* is proposed.
>
> *Tarina* gives the impression of being a different species, especially considering its small size, the very faintly black outlined forewing and the absence of the black margin on the hindwing. The ♀ also differs considerably, but then it is quite the contrary of the wet season form. Then it is much darker than the wet season form and the veins of the forewing are more broadly marked with black.
>
> The underside is very similar to *hippia*, especially on the hindwing, which has a brownish grey colour.
>
> Sikkim. March-April 4 ♂♂ 1 ♀, Lower Burma.'

Kaur *et al.* (2023) raised *tarina* to species rank and noted the following points to distinguish *tarina* from *avatar*:

> 'In *P. avatar* the uncus from the dorsal view is Y-shaped with median arm longer than lateral arms whereas in case of *P. tarina* the uncus from dorsal view is Y-shaped but the median arm is almost as long as the lateral arms. The apical process of valve is longer and stout in *P. tarina* whereas it is shorter and weakly sclerotized in *P. avatar*. The saccus is slightly small and broad in case of *P. avatar*.

> In addition to these characters, the adult males also differ in wing maculation. The black markings on the dorsal side of *P. avatar* are broader than in *P. tarina*. In latter, the ventral side is bluish-white with yellow tinge and veins brownish yellow whereas in case of *P. avatar* the ventral side is silver blue and veins are brownish black.
>
> In view of above strong differences, the form *tarina* is well separated from species *avatar* and hence raised to species level *i.e. Pareronia tarina*.'

Regarding the above, we note the following:

Fruhstorfer (1903b) noted the small size of *tarina* as one of the main distinctive features; he gave a forewing length of 40 mm for the five specimens examined by him, comprising four males and one female, while the forewing length of *avatar* varied from 53-54 mm measured off six specimens, four males and two females. Kaur *et al*. (2023) gave a wingspan of 60-70 mm for *tarina* (the specimen they illustrate on plate 3 has a forewing length of 35 mm) and 60-95 mm for 15 males and 3 females of *avatar* examined by them.

It is immediately evident from the above that size is not, in fact, a distinctive feature for *tarina* versus *avatar*, since even in a small series of *tarina*, there is a difference of a centimetre between specimens and the smallest *tarina* is the same size as the smallest *avatar*, if these two taxa have been reliably separated by Kaur *et al*. (2023) and if the measurements for wingspan pertain only to specimens examined by them in the study. It appears that Kaur *et al*. (2023) have measured the wingspan as a direct line between the apices of the forewings rather than as the distance from the centre of the thorax to the forewing apex, doubled, as suggested by Evans (1932). This may explain the discrepancy between the 40 mm forewing length of *tarina* measured by Fruhstorfer (1903b) and the wingspan by Kaur *et al*. (2023), which is less than double the forewing length of Fruhstorfer's specimens. In this context, Evans (1932) gives a wingspan of 60-90 mm for *P. avatar* (including *tarina*), so he may have found specimens much smaller than the type series of *tarina* examined by Fruhstorfer (1903b). It is likely that Fruhstorfer measured forewing length from apex to base of wing rather than to centre of the thorax, and thus the various measurements may not be directly comparable.

Next, we come to the shape of the uncus viewed dorsally, as described by Kaur *et al*. (2023). We have cropped the images provided by them in their paper and placed them together to better enable comparison. Kaur *et al*. (2023) noted that in *P. avatar*, 'the uncus from dorsal view is Y-shaped with median arm longer than lateral arms whereas in case of *P. tarina* the uncus from dorsal view is Y-shaped but the median arm is almost as long as lateral arms.' We could not observe this difference in the figures provided by them when placed side by side (Figures 1 & 2 in this paper).

On the apical process of the valvae, Kaur *et al*. (2023) state, 'the apical process of valve is longer and stout in *P. tarina* whereas it is shorter and weakly sclerotized in *P. avatar*.' Again, we could not observe this difference in the figures provided by them when placed side by side (Figures 3 & 4 in this paper).

In addition, Kaur *et al*. (2023) stated, 'the saccus is slightly small and broad in case of *P. avatar*.' Again, we were unable to notice this difference in the figures provided by them when placed side by side (Figures 5 & 6 in this paper).

Regarding the wing pattern and coloration, Fruhstorfer (1903b) noted that the hindwing lacked a dark outer margin. However, the narrow dark margin on the upperside of the hindwing is visible in the specimen of *tarina* illustrated by Kaur *et al*. (2023) and is no less prominent than the same margin on the *P. avatar* illustrated in the same paper.

Indeed, the only reliable distinctive feature between females of *P. avatar* and *P. tarina* appears to be the hindwing underside, which Fruhstorfer (1903b) noted was similar to what is now *P. anais*, with a brownish-grey ground colour. However, based on distribution and stated characters, Fruhstorfer's female from 'Lower Burma' probably belongs to another species, *Pareronia paravatar* Bingham, 1907, which is found in S. Myanmar and Indochina.

The name *tarina* Fruhstorfer, 1903 is unavailable for use at species group rank because it was clearly described as an infrasubspecific taxon as defined by ICZN (1999) Code article 45.5. Under article 45.5.1 it 'cannot be made available from its original publication by any subsequent action (such as "elevation in rank") except by a ruling of the Commission'. In the event that future studies, including mtDNA analysis, confirm that '*tarina*' warrants specific status, it would have to be described as new. We are currently of the opinion that *tarina* is just a seasonal form of the male of *Pareronia avatar*.

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The authors thank the Trustees of the Natural History Museum, London, and particularly Blanca Huertas and Suzanne Ryder for providing a photo of the type of *Papilio philomela* Fabricius, 1793.

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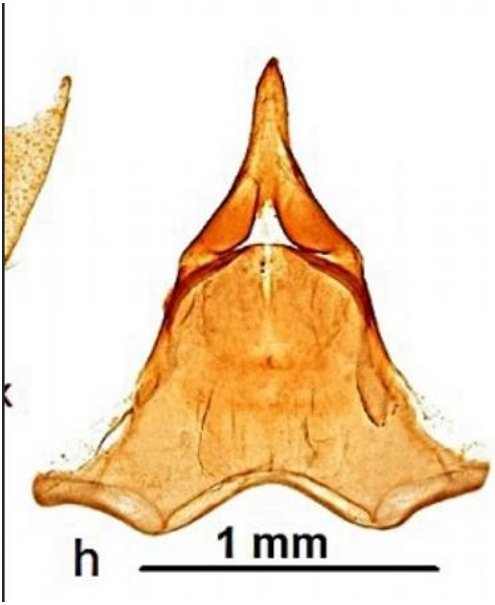

Fig 1: *avatar* uncus dorsal (Kaur *et al*., 2023)

Fig 2: *tarina* uncus dorsal (Kaur *et al*., 2023)

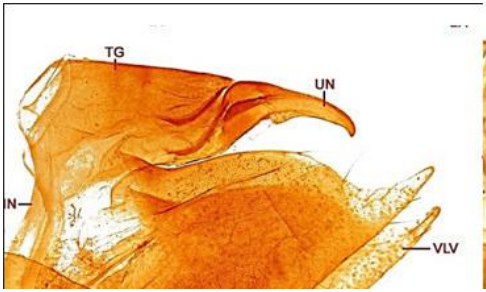

Fig 3: *avatar* apical valvae (Kaur *et al*., 2023)

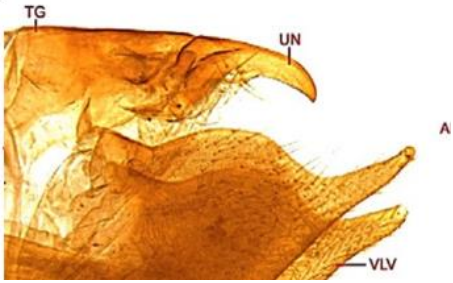

Fig 4: *tarina* apical valvae (Kaur *et al*., 2023)

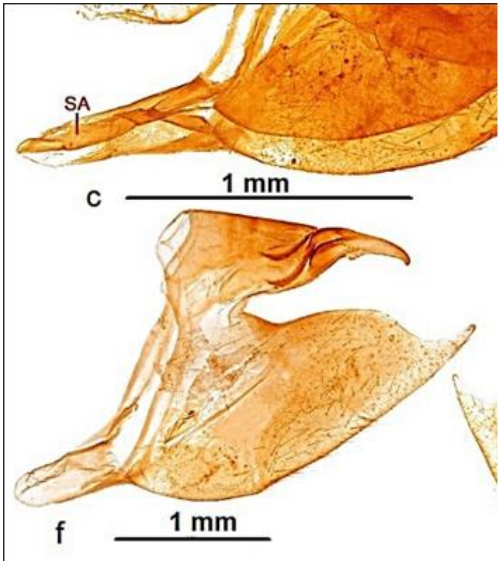

Fig 5*: avatar* saccus (SA) (Kaur *et al*., 2023)

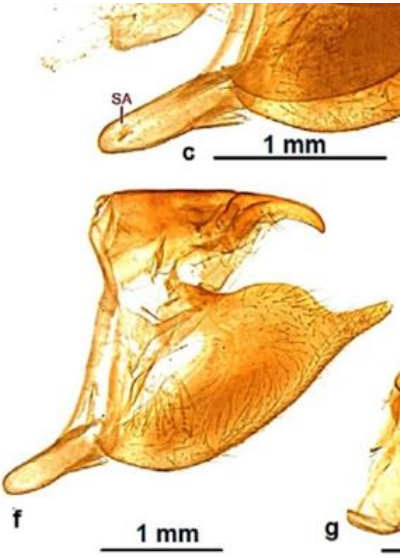

Fig 6: *tarina* saccus (Kaur *et al*., 2023)

OLDER LITERATURE	RECENT LITERATURE	VALID
Pareronia valeria (Cramer [1776]) (Evans, 1932; Varshney & Smetacek, 2015)	*Pareronia hippia* (Fabricius, 1787) (Kehimkar, 2016)	*Pareronia anais* ((Lesson, 1837) (Eliot, 1978)
Pareronia valeria ♀ form *philomela* (Fabricius, 1793) (Evans, 1932)	*Pareronia hippia* ♀ form *philomela* (Fabricius, 1793) (Kehimkar, 2016)	*Pareronia anais* ♀ form *livilla* Fruhstorfer, 1903
Pareronia ceylanica (C. & R. Felder, 1865) (Evans, 1932; Varshney & Smetacek, 2015)	*Pareronia ceylanica* (C. & R. Felder, 1865) (Varshney & Smetacek, 2015)	*Pareronia ceylanica* (C. & R. Felder, 1865)
Pareronia ceylanica naraka (Moore, 1877)	*Pareronia ceylanica naraka* (Moore, 1877)	*Pareronia anais naraka* (Moore, 1877)

(Evans, 1932)	(Varshney & Smetacek, 2015)	(Yata, 1981)
Pareronia avatar (Moore, [1858]) (Evans, 1932)	*Pareronia avatar* (Moore, [1858]) (Varshney & Smetacek, 2015)	*Pareronia avatar* (Moore, [1858])
Pareronia avatar Dry Season Form *tarina* Fruhstorfer, 1903b	*Pareronia tarina* Fruhstorfer, 1903 (Kaur *et al*., 2023)	*Pareronia avatar* Dry Season Form *tarina* Fruhstorfer, 1903b

MODIFICATION TO THE KNOWN WINGSPAN OF TWO INDIAN NYMPHALID BUTTERFLIES, *CYRESTIS THYODAMAS* AND *ATHYMA PERIUS*

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ABSTRACT

We report a wingspan of 68 mm for an individual of the Common Map *Cyrestis thyodamas* and 54 mm for an individual of the Common Sergeant *Athyma perius*, making these the largest and smallest known members of their species respectively.

INTRODUCTION

Measurement is an important part of taxonomy. In butterflies, there is only one measurement i.e. wingspan. This measurement is open to several interpretations. The smallest measurement tell us what the minimum food requirement is for a species so that it can complete it's metamorphosis: if it gets less than minimum food in the larval stage, metamorphosis will be incomplete. The largest specimen tells us that in some way, there is a barrier to the butterfly growing larger even in the presence of sufficient food. This would probably relate to the limitations of the physical design of the butterfly.

During the 18th and 19th centuries, it was fashionable to pin butterflies with the forewing costae almost in a straight line. At that time wingspan was measured as the distance between the forewing apices. During the latter half of the 19th century, it became fashionable to raise the forewings until the forewing termens were in a straight line. Since the apices were now much closer together, this would reduce the measured wing span following the older method.

Evans (1932) measured all Indian butterflies known at the time and available to him using a measurement from the centre of the thorax to the tip of a forewing apex and doubled the result, assuming the butterfly to be bilaterally symmetrical. Evans (1932) gave a measurement of 50-60 mm for all the known subspecies of *Cyrestis thyodamas* Boisduval, 1846 known from India and a measurement of 60-70 mm for *Athyma perius* (Linnaeus, 1758).

MATERIAL EXAMINED

1. Lepidoptera: Nymphalidae: Cyrestinae

Cyrestis thyodamas Boisduval, 1846

C. t. ganescha (Kollar, 1848)

Specimen examined - One female. Wingspan- 68 mm. 24.x.1995. Butterfly Research Centre, Jones Estate, Bhimtal, Uttarakhand, India. 1500m. *Leg*. Peter Smetacek *Coll*. B.R.C., Bhimtal. (Figure 1)

2.Lepidoptera:Nymphalidae:Limenitidinae

Athyma perius (Linnaeus, 1758)

Specimen examined - One male. Wingspan- 54 mm. 26.ii.2023. Butterfly Research Centre, Jones Estate, Bhimtal, Uttarakhand, India. 1500 m. *Leg*. Kanika Pandey *Coll*. B.R.C., Bhimtal. (Figure 2)

DISCUSSION

The two specimens measured in this paper add to the measurements of those known species. In the case of *C. thyodamas*, the largest specimen known measured 60 mm (Evans, 1932). The present specimen measures 68 mm, making it the largest known specimen of *C. thyodamas*. Future references to the wingspan of this species may quote 50 – 68 mm, the latter figure based on the specimen measured in the present study.

In the case of *A. perius*, the smallest known specimen measured 60 mm (Evans, 1932). The present specimen measures 54 mm making it the smallest known specimen of *A. perius*. Future references to the wingspan of this species may quote 54-70 mm, the former figure based on the specimen measured in the present study.

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Figure 1: *Athyma perius*

Figure 2: *Cyrestis thyodamas*

SIGHTING OF COMMON CERULEAN *JAMIDES CELENO* (CRAMER, [1775]) (INSECTA: LEPIDOPTERA: LYCAENIDAE) IN ARAVALLIS OF HARYANA BORDERING DELHI, INDIA

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The butterfly Common Cerulean *Jamides celeno* is distributed in most parts of India including Peninsular India, West Bengal, Uttarakhand to North East India, eastern part of Rajasthan and Uttar Pradesh (Sharma, 2014; Varshney, 2015; Kehimkar, 2016; De, *et al.* 2023). It has been recently reported from Jammu & Kashmir (Sheikh, 2019). There is no published or confirmed record of this butterfly from Haryana, and a report mentioning this butterfly from Delhi does not provide photographic evidence or voucher evidence (Biswas, *et al.* 2017). *J. celeno* keeps itself low among bushes and prefers partly shady habitat; has a weak fluttering type of flight and rests on leaves (Wynter-Blyth, 1957).

On the cloudy afternoon of 23.09.2023, a female *J. celeno* was sighted in partly shady surroundings at Aravalli Biodiversity Park, Gurugram, Haryana (28°29'08"N, 77°06'52"E). The park – an ecological restoration area, is situated in Aravalli hills along the administrative boundary of Delhi and Haryana. The butterfly was observed for 5-7 minutes and photographed with a digital camera (Figure 1). It fluttered for a few minutes close to its larval host plant (*Abrus precatorius*), after which it settled on a nearby plant. The present communication therefore provides the photographic evidence of *Jamides celeno* from Aravalli landscape of Haryana-Delhi.

It would be interesting to keep track of natural history and sighting records of this butterfly to elucidate if the sighted individual is a stray or accidentally transported; or the butterfly is in the process of expanding its range to this part of North West India.

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Figure : Female *Jamides celeno* sighted in Aravallis of Haryana bordering Delhi.

BUTEA SUPERBA ROXB. AS NEW LARVAL HOST PLANT FOR THE CHESTNUT-STREAKED SAILER BUTTERFLY *NEPTIS JUMBAH* MOORE, [1858] (INSECTA: LEPIDOPTERA: NYMPHALIDAE)

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The Bombay Natural History Society (BNHS) Nature Reserve is a forested area spread over 33 acres and is nestled between Dadasaheb Phalke Chitra Nagari (aka Film City) and Sanjay Gandhi National Park in Mumbai City of Maharashtra, India. The Reserve also has a small butterfly garden spread over an area of around quarter of an acre.

The Chestnut-streaked Sailer butterfly *Neptis jumbah* Moore, [1858] (Insecta: Lepidoptera: Hesperiidae) is a common butterfly found here. It is mostly seen during the monsoon and post monsoon in the forests of SGNP and BNHS Nature Reserve, Mumbai.

On 10 September 2023, we found one dark brown caterpillar on the leaf tip of a Palash Climber *Butea superba* Roxb. plant. The caterpillar had eaten both sides of the leaf tip, leaving the midrib intact and it was perched on the midrib. We could identify the caterpillar as of a Sailer *Neptis* sp. We searched for more caterpillars on the Palash Climbers and soon found two more caterpillars on two additional plants, perched in similar fashion on the midrib at leaf tip. The caterpillars had chocolaty white patches on sides of tail end marked with short white lines.

We collected these caterpillars and reared them in rearing containers. They were fed with leaves of *Butea superba* Roxb. The containers were cleaned of the frass every day. The caterpillars ate the green parts of leaves leaving the midrib and bigger veins intact, creating multiple holes in the leaf or sometimes a small dangling part of the leaf hanging to the remaining vein (see image).

Two caterpillars pupated on 18 September 2023, one on the inner wall of a container and another on the upperside of a leaf. The pupae were cream coloured and shiny, depending on the angle of light. Two adult butterflies eclosed on 25 September 2023 with a pupal diapause of 9 days. Both were released. The third caterpillar was found infected and died on 20 September 2023, after feeding well on the leaves of *B. superba* and showing normal growth.

The reported larval host plants for *N. jumbah* are summarized by Robinson *et al.* (2001) and later by Nitin *et al.* (2018) as: *Bombax*, *Bombax ceiba*, *Byttneria* (Bombacaceae); *Trema* (Cannabaceae);

Elaeocarpus (Elaeocarpaceae); *Mallotus philippensis* (Euphorbiaceae). *Fabaceae*, *Cassia fistula*, *Dalbergia*, *Dalbergia latifolia*, *Erythrina stricta*, *Moullava spicata*, *Pongamia*, *Pongamia pinnata*, *Pterocarpus marsupium*, *Xylia*, *Xylia xylocarpa* (Fabaceae); *Nothapodytes nimmoniana* (Icacinaceae); *Malvaceae*, *Grewia*, *Grewia serrulata*, *Hibiscus*, *Pterygota alata*, *Thespesia populnea* (Malvaceae); *Rhamnaceae*, *Ziziphus*, *Ziziphus jujuba* (Rhamnaceae) and Urticaceae.

The sighting of three caterpillars of *N. jumbah* on the *B. superba* plants and its rearing till eclosion of adult butterflies clearly indicates the regular use of the plant as larval host. Looking at the list of larval host plants reported previously, this is clearly a new record of larval host plant for *N. jumbah* and worth placing on record.

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Figure 1: Chestnut-streaked Sailer caterpillar

Figure 2: Chestnut-streaked Sailer Pupa

Figure 3: Freshly eclosed adult under side

Figure 4: Freshly eclosed adult upper side

Figure 5: Feeding pattern of caterpillar

A REPORT ON PREDATION OF CHESTNUT-TAILED STARLING *STURNIA MALABARICA* (GMELIN, 1789) ON A *HEMIDACTYLUS* GOLDFLUS, 1820 (GEKKONIDAE) SPECIES FROM ANDAL BLOCK, WEST BENGAL, INDIA

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Chestnut-tailed Starling *Sturnia malabarica* belonging to the Sturnidae family is a resident in the north-eastern part of the Indian Subcontinent and a summer visitor to the Western and Central Himalayas (Grimmett et al., 2011). It also occurs as a winter visitor to most of southern India (Grimmett *et al*., 2011). *S. malabarica* is a slim bird of medium size (21 cm) with silvery-grey upperparts, dull rufous till breast, and brighter below; wings are black and grey; both sexes are alike (Grewal *et al*., 2016). The reported food of *S. malabarica* includes ber, lantana and other berries, banyan and peepul figs, nectar, and insects (Ali, 2002).

During an opportunistic survey on 15 June 2022, the author photographed an adult *S. malabarica* (Figs. 1 & 2) preying on a gecko of *Hemidactylus* sp. at around 03:58 p.m. from the Village Dubchururia (23.58°N, 87.23°E; 112m asl) of Andal block situated at Paschim Bardhaman district, West Bengal, India. The author observed that the bird caught something from the bush and flew off and after that, it sat on the roof of a nearby building and swallowed the gecko. Nikon D5300 camera with Nikkor Af-P 70–300mm lens was used for photo documentation of the incident. The gecko was identified as the species of the genus *Hemidactylus* by Daniel (2002). The present study area is a semi-urban area with agricultural fields and remnants of dry deciduous forests with more than 10 large water bodies.

Birds of the Sturnidae family are known as bio-controlling agents in the agricultural world (Rahman, 2019). Studies on food habits and feeding behaviour of Chestnut-tailed Starling *S. malabarica* has not been carried out in India however Rahman (2019) studied it in Bangladesh. Diet plays a significant role in bird ecology (Duraes & Marini, 2003). The study on feeding ecology helps to understand the community structure, co-existence, and resource use pattern in its habitat (Asokan & Ali 2010; Kaur & Kler 2018). Chestnut-tailed Starling *S. malabarica* are omnivorous and the diet constituted 67.15% animal matter, 20.53% plant matter, and 12.32% food waste as shown by Rahman (2019). Animal diets included insect larvae (39%), beetles (16%), dragonflies (7%), damselflies (3%), and

worms (2%) (Rahman, 2019). Though the present report the author suggesting that the Chestnut-tailed Starling *S. malabarica*, is becoming an opportunistic predator and recommending a detailed study on ecology of such commonly found birds.

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Figure 1: Chestnut-tailed Starling captured a Gecko (*Hemidactylus* sp.)

Figure 2: Chestnut-tailed Starling preying on a Gecko (*Hemidactylus* sp.)

EL NIÑO YEARS DECIMATE BUTTERFLY COMMMUNITY IN A WEST HIMALAYAN FOREST

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ABSTRACT

The collapse of the butterfly community in Maheshkhan Reserve Forest, Uttarakhand following dry winters in 2009 and 2023 caused by El Niño is documented. 44% of the 95 species recorded in normal years were recorded in 2009 and 49% in 2023. More than 50% of butterfly species comprising the normal community were absent in both El Niño years. There were practically no butterflies on the wing in March and April, 2023 compared to hundreds of individuals belonging to 50+ species in normal years. In May and June, very few individuals were on the wing. All butterfly species using *Quercus leucotrichophora* as a larval hostplant were present in 2023, although only 57% were present in 2009.

INTRODUCTION

The emergence of butterflies from their pupae is triggered by certain environmental conditions such as day length, humidity and temperature. North and south of the tropics, the emergence of butterflies is restricted to particular seasons, with some being univoltine and others bi- or multi-voltine. Dry weather spells often cause the desiccation of larvae and pupae of Lepidoptera resulting in comparatively greatly reduced populations (Smetacek, 2011). Hailstorms, prolonged inclement weather, such as dry periods and untimely wet spells and forest fires are some of the other factors known to cause widespread damage to Lepidopteran communities.

The El Niño effect refers to the unusual warming of the eastern Pacific Ocean in the Southern Hemisphere. The results are widespread, affecting global climatic patterns. The association between El Niño and deficient winter rainfall or drought is statistically significant over the subdivisions west of longitude 80° East and north of 12° North (Mooley & Parthasarathy, 1983). In the western Himalaya, this causes the failure of winter rains and very humid summers. The effects of the prolonged dry spell during winter on insect populations have not been previously studied, mainly because El Niño events are unpredictable.

Maheshkhan is a Reserve Forest on the southern face of the Gagar range in Nainital district of Uttarakhand, India (79°35'40" E 29°26' 7" N (Atkinson, 1882))less than a degree east of the area designated by Mooley & Parthasarathy (1983) and equally affected by association between El Niño and deficient winter rainfall or drought. It comprises several hillsides between 1600 meters and 2400 meters. The lower reaches sustain dense broadleaf evergreen sub-tropical forest with Himalayan silver oak *Quercus leucotrichophora* A. Camus., *Quercus floribunda* Lindl., *Rhododendron arboreum* Smith, *Lyonia ovalifolia* (Wall.) Drude and *Acer oblongum* Wall. ex DC. Conifers are represented by Chir pine (*Pinus roxburghii* Sarg.) along the ridges and on dry hillsides with some *Cupressus* L. hybrids planted randomly on hillsides. There is an undergrowth of hill bamboo (*Arundinaria falcata* Nees) and grasses on ridges and in forest clearings.

The World Meteorological Organization (WMO) forecasted that there is a 90% probability of the El Niño event continuing during the second half of 2023 (Anonymous, 2023).

MATERIALS AND METHODS

Maheshkhan forest was visited several times in March, April, May and June 2023. Due to the very unusual rainy and cold weather on most days, visits were opportunistic. Easily identified butterfly species such as *Cyrestis thyodamas* Boisduval, 1846, *Sephisa dichroa* (Kollar, [1844]), *Auzakia danava* (Moore, [1858]), *Graphium cloanthus* (Westwood, 1841), *Aporia agathon* (Gray, 1831), *Pieris canidia* (Linnaeus, 1768) and *Dodona durga* (Kollar, [1844]) were identified in the field and species belonging to the Lycaenidae and the genera *Ypthima* Huebner, 1818, *Lethe* Huebner, [1819], *Callerebia* Butler 1867, *Neptis* Fabricius, 1807 were photographed and later identified against identified specimens in the reference collection of the Butterfly Research Centre. In less than five cases, it was not possible to obtain photographs showing distinctive features of some individuals observed and these have been omitted from this study. Hesperiidae have been entirely omitted from this study since specimens are required for confirming species level identification of many taxa.

Although butterfly activity begins early in the morning at low elevation in India, above 1800 m there is little activity before 10 a.m. or after 2 p.m. Therefore, observations were restricted to this period except on those days when observations were interrupted by rainfall. It is usual that, with the onset of the monsoon in the second half of June, butterfly activity rapidly diminishes. Satyrinae are usually still active, but there is a sharp drop in populations of other groups (Smetacek, 2011).

During the summer of 2023, butterflies were about in such small numbers, usually singletons, that it was possible to actually count individuals, unlike in normal years, when the quantity, variety and continuous movement of butterflies makes such an exercise impossible. In cases where active and numerous butterflies made individual counts meaningless, the term "few" has

been used to suggest that less than 5 individuals were about; "several" would suggest less than 10 individuals while "common" implies around 25 individuals were active; "very many" was used when there appeared to be more than 100 individuals active. In the case of territorial butterflies like *Kaniska canace* (Linnaeus, 1763), only one is encountered at a time, in which case the term "several" refers to every traditional "beat" being occupied by an aggressive male.

Larvae of forest butterflies are usually quite choosy about the site of pupation. In the present context, this would be crucial to survival of the species. The numbers of individuals in 2009 and 2023 were highly reduced. The number of species that are usually present in normal years but did not occur in both El Niño years is small, around 34% of the total number of species recorded in the study area. Perhaps these species have a low threshold of tolerance for extended periods of low atmospheric humidity; perhaps it was only the luck of the draw, for even in cases where a species did manage to complete its life cycle in one or the other or even both El Niño years, the successful ones were represented by very few individuals. In no case in both El Niño years did a species of butterfly appear to be unaffected by the unusual weather pattern, as might have been reflected in the species being recorded in numbers comparable to normal years. Therefore, the presence or absence of some species in El Niño years might be random, determined by the choice of the pupation site chosen by individual caterpillars, which might happen to be in a location with relatively higher humidity, enough to prevent desiccation of the pupae.

The terms "fresh" and "worn" in tables 2 and 3 describes the condition of the butterflies, suggesting when they emerged from their pupae.

The data obtained in 2009 (Smetacek, 2011) was compared with data generated in March, April, May and June, 2023 as well as data from previous years from 1986 onwards.

RESULTS AND DISCUSSION

Forest fires during spring and summer were observed to completely destroy the local butterfly community, as happened in the summer of 2009 (Smetacek, 2011). In the present study, the local forest guard clarified that there was no forest fire in the study area in Maheshkhan Reserve Forest during 2023.

Smetacek (2011) suggested that low atmospheric humidity during the winter of 2008-2009 resulted in reduced emergence the following season, with 52% of species not represented at all and greatly reduced populations of those that did manage to emerge, compared with the 23-year period from 1986 to 2008 when opportunistic observations were undertaken in the study area.

The drop in butterfly populations documented in the study area in 2009 was believed to be a one-off event until 2023, when a similar pattern repeated itself both in terms of low atmospheric humidity

during winter (Table 10) and reduced butterfly populations the following spring and summer (Table 1-9).

Table 1: The total percentage of butterfly species recorded and percentage of butterfly species feeding on climbers and monocotyledons (grasses and bamboos).

	1986-2022	**2009**	**2023**	**2009 & 2023**	**Remarks**
Total percentage of butterfly species present	95 species (100%)	40 species (44%)	47 species (49%)	28 species (29.5%)	Less than half the species were present in 2009 and 2023; only 30 % were present in both years.
Climbers (6 species)	6 species (100%)	3 species (50%)	4 species (67%)	3 species (50%)	
Monocotyledons (11 species; 1986-2022)	11 species (100%)	7 species (63%)	6 species (54%)	0 species	
Monocotyledons (17 species, 1986-2023)	17 species (100%)	7 species (41%)	12 species (70.58%)	0 species	6 additional species were recorded 2023.

The drop in butterfly species richness and numbers in 2023 was so severe that butterflies were absent even on sunny days in March and April, 2023 and it was actually possible to reliably count individual butterflies during May and June, 2023, since the total number was usually less than 5 individuals of a given species seen in a day. This was drastic compared to the hundreds of individuals of each species normally witnessed at peak flying times in the same location in normal years. Table 2 compares the butterfly community on the same dates on 28 April in two different years, 1989, a normal year and 2023, an El Niño year. Table 3 compares the community on two days, 4 June and 6 June, 1998 (a normal year) versus the community on 5 June, 2023, an El Niño year. There is a stark contrast in the numbers of butterflies on the wing.

Table 2

Few= less than 5; several = less than10; common = less than 25; many = less than 50; very many = less than100 individuals; abundant: more than 100 individuals

Species	**28.iv.1989**	**28.iv.2023**
PAPILIONDAE		
Atrophaneura aidoneus (Doubleday, 1845)	A few fresh specimens	-
Byasa dasarada (Moore, 1858)	A few fresh males	-
Graphium cashmirensis (Rothschild 1895)	A few worn males and females	-
Papilio agestor Gray, 1831	2 worn females	-
PIERIDAE		
Pieris brassicae (Linnaeus, 1758)	Common	-
Pieris canidia (Linnaeus, 1768)	Common	-
Gonepteryx nepalensis Doubleday, 1847	Common	-
Belenois aurota (Fabricius, 1793)	1	-
RIODINIDAE		
Dodona durga (Kollar, [1844])	Abundant	-
Dodona dipoea Hewitson, 1866	Few, worn and fresh	-
Dodona eugenes Bates, [1868]	Few, worn	-
LYCAENIDAE		
Heliophorus sena (Kollar, [1844])	Fresh	-
Celastrina huegeli (Moore, 1882)/ *C. gigas* (Hemming 1928)	Fresh and worn specimens	-
Pratapa icetas (Hewitson, 1865)	1 female	-
Rapala selira (Moore, 1874)	Worn	-
NYMPHALIDAE		
Mycalesis francisca (Stoll, [1780])	2 fresh specimens	-
Callerebia annada (Moore, [1858])	Worn specimens	-
Auzakia danava (Moore, [1858])	Fresh males, worn females	-
Athyma opalina (Kollar, [1844])	Fresh, abundant	-
Neptis soma Moore, 1858	Few, worn specimens	-
Junonia iphita (Cramer, [1779])	Few, worn specimens	-
Kaniska canace (Linnaeus, 1763)	1	-
Aglais caschmirensis (Kollar, [1844])	1	-
Libythea lepita Moore, [1858]	Fresh, many specimens	-

Table 3

Species	**4.vi.1998**	**6.vi.1998**	**5.vi.2023**
PAPILIONIDAE			
Byasa dasarada (Moore, 1858)	Few	Few	3
Atrophaneura aidoneus (Doubleday, 1845)	1 rotten, dead in stream		
Graphium cloanthus (Westwood. 1841)	Few	1	
Graphium agamemnon (Linnaeus, 1758)		1 female ovipositing	
PIERIDAE			
Catopsilia pomona (Fabricius, 1775)	Common		
Pieris canidia (Linnaeus, 1768)	Common		
Pieris brassicae (Linnaeus, 1758)			1 female
Pontia daplidice (Linnaeus, 1758)	Many between Bhimtal and Bhowali		
Gonepteryx rhamni Doubleday, 1847	Common		
Delias sanaca (Moore, 1857)	200+ dead in stream, hundreds on the wing	Few, mainly females	2
Aporia agathon (Gray, 1831)	200+ dead in stream, hundreds on the wing	Few	24
NYMPHALIDAE			
Orinoma damaris Gray, 1846	2	1	
Lethe isana (Kollar, [1844])	Common	Few	4
Lethe confusa Aurivillius, 1898			1
Lethe sidonis (Hewitson, 1863)	Several	Few	
Callerebia nirmala (Moore, 1865)	Very many	Many	29
Ypthima nikaea Moore,	Very many	Many	9

[1875]			
Ypthima nareda (Kollar, [1844])			1
Lasiommata schakra (Kollar, [1844])	Few	Few	
Parantica aglea (Stoll, [1782])	Several		
Parantica sita (Kollar, [1844])	Several	Several	1
Euploea mulciber (Cramer, [1777])		1 male	
Athyma opalina (Kollar, [1844])	Several	Several	1
Neptis narayana Moore, 1857	Several	Many	1
Neptis mahendra Moore, 1872	Several		
Neptis sankara (Kollar, [1844])	Several	Few	
Neptis ananta Moore, 1858		2	
Neptis sappho (Pallas, 1771)		Several	
Neptis nata Moore, [1858]		Few	
Neptis soma Moore, 1858			1
Neptis miah Moore, 1857			1
Auzakia danava (Moore, [1858])	1 female	1pair	1 female
Euthalia patala (Kollar, [1844])	4-5	Several	
Sephisa dichroa (Kollar, [1844])	8-9	Few	2
Pseudergolis wedah (Kollar, 1848)	Several		
Telchinia issoria Huebner, [1819]	Several	Few	
Phalanta phalantha (Drury, [1773])	1 dead in water		

Argynnis childreni Gray, 1831	3	3	
Symbrenthia niphanda Moore, 1872		1	
Kaniska canace (Linnaeus, 1763)	Several	Several	
Vanessa indica (Herbst, 1794)	Several		
Aglais caschmirensis (Kollar, [1844])		1	
Junonia iphita (Cramer, [1779])	Several	Several	2
Cyrestis thyodamas Boisduval, 1846	Several	Several	2
RIODINIDAE			
Dodona durga (Kollar, [1844])	Many	Many	6
Dodona dipoea Hewitson, 1866	Many	Many	
Dodona eugenes Bates, [1868]	Many	Many	3
Dodona ouida Moore, 1866	1 female		
LYCAENIDAE			
Inomataozephyrus syla (Kollar, [1844])	Several	10	4
Shirozuozephyrus birupa (Moore, 1877)	1 male	2 males	1 female
Thermozephyrus ataxus (Westwood, 1851)		5 males	
Shizuyaozephyrus ziha (Hewitson, [1865])	Several	Many	
Euaspa milionia (Hewitson, 1869)	1 dead in stream		
Chaetoprocta odata (Hewitson, 1865)		2	
Chliaria kina (Hewitson, 1869)	Several		
Arhopala rama (Kollar, [1844])	Several	Few	2
Arhopala dodonea	Several	Few	

Moore, [1858]			
Arhopala ganesa (Moore, [1858])	Few	Many	4
Ancema ctesia (Hewitson, 1865)		1 male	
Rapala nissa (Kollar, [1844])	Several	Few	
Spindasis nipalicus (Moore, 1884)	1	Few	2
Oreolyce vardhana (Moore, [1875])	1	1	
Aricia agestis (Denis & Schiffermueller, 1775)		1	
Acytolepis puspa (Horsfield, [1828])	Several	Several	
Celatoxia marginata (de Niceville, 1884)	Several		
Udara albocoerulea (Moore, 1879)		Males	1
Celastrina hugelii (Moore, 1882)		Males and females	1 male
Heliophorus sena (Kollar, [1844])	Several	Several	1
Lampides boeticus (Linnaeus, 1767)	Several		

Data presented in Table 1 shows that, of the total 95 species recorded from Maheshkhan between 1986 and 2009, 56% did not appear in the survey in 2009 while 51% did not appear in 2023. That is, the emergence of more than half the butterfly species are affected in El Niño years and those that do emerge do so in much smaller numbers than in normal years.

Of interest is that out of a total of 95 species, 29.5% appeared both in 2009 and 2023; 14% of the species appeared only in 2009 while 19% of the species appeared only in 2023. 34% of the total species recorded did not appear in both 2009 and 2023. It is likely that the 34% of species that did not appear in both 2009 and 2023 are exceptionally prone to desiccation during winter. Four species (5%) of those that did not appear in both the years were judged migrants, breeding at lower elevation (*Papilio demoleus* Linnaeus, 1758; *Danaus chrysippus* (Linnaeus, 1758); *D. genutia* (Cramer, [1779]) and *Phalanta phalantha* (Drury, [1773]) which means that 27 species (29%) of residents did not appear in both El Niño years.

An unusual observation in 2023 was the appearance of 12 species that had not been observed in the area in previous years. Of

these, *Ypthima baldus* (Fabricius, 1775) and *Y. nareda* were probably ignored earlier, as was *Prosotas nora* (C. Felder, 1860) (Smetacek, 2011). However, species such as *Neptis zaida* Doubleday, [1848], *N. miah*, *Symbrenthia lilaea* (Hewitson, 1864), *Libythea myrrha* Godart, 1819, *Lethe confusa*, *L. kansa* (Moore, 1857) and *Colias erate* (Esper, 1805) were definitely not present between 1986-2022. This would take the number of species recorded over the years from Maheshkhan to 107 species of which 44% were present in 2023. Although 44% appears a reasonable proportion for emergence in years of climatic irregularities, one needs to take into consideration the fact that populations were very low, usually less than 10 individuals encountered in a day compared to 20-50 and, in cases like *Delias sanaca*, *Aporia agathon*, *Dodona durga* (Kollar, [1844]), hundreds of individuals in a day during late May and early June. Also of interest is that all the 12 new species records for Maheshkhan are of butterflies previously recorded at lower elevations in the area, usually in the Bhimtal-Sattal area and below, that is below 1500 m.

Regarding larval hostplants, of the 95 species of butterflies known from Maheshkhan, the larval hostplants of 9 species are unknown: these are *Auzakia danava*, *Neptis mahendra*, *Neptis sankara, Neptis ananta*, *Neptis narayana*; *Argynnis childreni*, *Euaspa milionia*, *Shizuyaozephyrus ziha* and *Thermozephyrus ataxus* (Table 8) (Robinson *et al*., 2010).

Of the 86 species whose larval hostplants are known, 6 are known to feed on climbers; *Atrophaneura aidoneus*, *Byasa polyeuctes* (Doubleday, 1842), *Byasa dasarada*, *Parantica aglea*, *Parantica sita* and *Kaniska canace* (Linnaeus, 1763). Of these 6 species, *Byasa polyeuctes* did not appear in 2009 and 2023, *P. aglea* and *P. sita* did not appear in 2009 (Table 4).

Table 4

Climber feeders	**2009**	**2023**	**Absent in both years**
Atrophaneura aidoneus (Doubleday, 1845)	Present	Present	
Byasa polyeuctes (Doubleday, 1842)	Present	-	
Byasa dasarada (Moore, 1858)	Present	Present	
Parantica aglea (Stoll, [1782])	-	-	Absent
Parantica sita (Kollar, [1844])	-	Present	
Kaniska canace (Linnaeus, 1763)	Present	Present	

Of the 95 species, 11 species, all Satyrinae, feed on monocotyledons, all Poaceae. Of these, *Mycalesis francisca* and *Neope pulaha* (Moore, [1858]) did not appear in 2009 or 2023; *Lethe sidonis*, *Lasiommata schakra* and *Melanitis leda*

(Linnaeus, 1758) were present in 2009 but absent in 2023, while *Orinoma damaris* and *Callerebia annada* were absent in 2009 and present in 2023. The species that appeared in both 2009 and 2023 were *Lethe isana*, *Callerebia nirmala* and *Ypthima nikaea*. In addition, in 2023, *Lethe kansa* (Moore, 1857), *Callerebia hybrida* Butler, 1880, *Lethe confusa*, *Ypthima baldus*, *Y. nareda* and *Y. sakra* Moore, 1857 were recorded, which were never before recorded from Maheshkhan. In short, 8 of the total of 17 species of Satyrinae ever recorded from Maheshkhan were active in 2009, while 13 of the 17 species were active in 2023 (Table 5).

Table 5

Monocotyledon feeders	**2009**	**2023**	**Absent in both years**
Mycalesis francisca sanatana Moore, [1858]	-	-	Absent
Melanitis leda (Linnaeus, 1758)	Present	-	
Lethe sidonis (Hewitson, 1863)	Present	-	
Lethe isana (Kollar, [1844])	Present	-	
Lethe verma (Kollar, [1844])	Present	-	
Lethe kansa (Moore, 1857)	-	Present	
Lethe confusa Aurivillius, 1898	-	Present	
Neope pulaha (Moore, [1858])	-	-	Absent
Lasiommata schakra (Kollar, [1844])	Present	-	
Orinoma damaris Gray, 1846	-	-	
Callerebia annada (Moore, [1858])	-	-	
Callerebia nirmala (Moore, 1865)	Present	-	
Callerebia hybrida Butler, 1880	-	Present	
Yphthima nikaea Moore, [1875]	Present	-	
Ypthima nareda (Kollar, [1844])	-	Present	
Ypthima sakra Moore, 1857	-	Present	
Ypthima baldus (Fabricius, 1775)	-	Present	

Regarding the 9 species that feed on herbs and non-woody shrubs, 5 species, namely, *Pontia daplidice*, *Issoria lathonia* (Linnaeus, 1758), *Aricia agestis*, *Lycaena panava* and *Pseudozizeeria maha*, did not appear in both 2009 and 2023. 4 species, *i.e. Pieris brassicae*, *Pieris canidia*, *Colias fieldii* Menetries, 1855 and *Lampides boeticus* appeared both in 2009 and 2023. There were no herb feeders that appeared in one of these years and not in the other (Table 6). However, *Colias erate* (Esper, 1805), an herb feeder, was recorded twice in 2023 and represents an addition to the butterflies recorded in Maheshkhan forest. Smetacek (2002) noted that the population of *Pontia daplidice* collapsed in Nainital district during summer 1999, since the failure of the winter rains during 1998-1999 prevented its larval hostplant, *Lepidium virginicum*, from germinating over most of the district. The population subsequently recovered in the next year. It is of interest that 1997-98 was regarded as one of the most powerful El Niño - Southern Oscillation events in recorded history (Slingo & Annamalai, 2000). Unfortunately, the butterflies of Maheshkhan forest were not surveyed at all in 1999.

Table 6

Herbs and annuals	**2009**	**2023**	**Absent in both years**
Pieris brassicae (Linnaeus, 1758)	Present	Present	
Pieris canidia (Linnaeus, 1768)	Present	Present	
Colias fieldii Menetries, 1855	Present	Present	
Pontia daplidice (Linnaeus, 1758)	-	-	Absent
Issoria lathonia (Linnaeus, 1758)	-	-	Absent
Aricia agestis (Denis & Schiffermueller, 1775)	-	-	Absent
Pseudozizeeria maha (Kollar, [1844])	-	-	Absent
Lampides boeticus (Linnaeus, 1767)	Present	Present	
Lycaena panava (Westwood, 1852)	-	-	Absent

Of the 60 species that feed on woody dicotyledons excluding climbers, 18 species were present in both 2009 as well as 2023, and 19 were absent in both these years, representing 30% and 32% respectively of the total. 9 of the 60 species were present in 2009 and not in 2023 while 12 of the 60 species were

present in 2023 but not in 2009. Species that are known to feed on *Quercus leucotrichophora*, namely *Euthalia patala*, *Sephisa dichroa*, *Arhopala dodonea*, *Shirozuozephyrus birupa*, *Inamataozephyrus syla*, *Arhopala rama* and *A. ganesa* were present in both 2009 and 2023, although at very low density. It is of interest that 57% of the 7 species that feed on *Q. leucotrichophora* were not recorded in 2009, while 100% appeared in 2023 (Table 9). Similarly, species that are known to feed on *Berberis chitria Buch*.-Ham. ex Ker Gawl., namely *Aporia agathon* and *Athyma opalina* were also present in both years, again at much lower densities than normal (Table 7).

Table 7

Woody shrubs /tree feeders	**2009**	**2023**	**Absent in both years**
Papilio agestor Gray, 1831	Present	-	
Papilio protenor Cramer, [1775]	Present	-	
Papilio demoleus Linnaeus, 1758	-	-	
Graphium sarpedon (Linnaeus, 1758)	-	-	Absent
Graphium cloanthus (Westwood. 1841)	-	Present	
Graphium cashmirensis (Rothschild, 1895)	Present	-	
Aporia soracta Moore, 1857	-	-	
Aporia agathon (Gray, 1831)	Present	Present	
Delias belladonna (Fabricius, 1793)	Present	-	
Delias sanaca (Moore, 1857)	-	Present	
Gonepteryx rhamni Doubleday, 1847	Present	-	
Eurema hecabe (Linnaeus, 1758)	Present	-	
Belenois aurota (Fabricius, 1793)	Present	Present	
Catopsilia pomona (Fabricius, 1775)	Present	-	
Euploea mulciber (Cramer, [1777])	-	Present	
Danaus chrysippus (Linnaeus, 1758)	-	-	Absent
Danaus genutia (Cramer, [1779])	-	-	Absent
Polyura dolon (Westwood, 1847)	-	-	Absent
Sephisa dichroa (Kollar, [1844])	-	Present	
Euthalia patala (Kollar, [1844])	-	Present	
Athyma opalina (Kollar, [1844])	Present	Present	
Neptis sappho (Pallas, 1771)	-	Present	

Neptis soma Moore, 1858	-	Present	
Cyrestis thyodamas Boisduval, 1846	Present	Present	
Pseudergolis wedah (Kollar, 1848)	-	Present	
Junonia iphita (Cramer, [1779])	Present	Present	
Vanessa cardui (Linnaeus, 1758)	Present	Present	
Vanessa indica (Herbst, 1794)	Present	Present	
Aglais cashmirensis (Kollar, [1844])	-	-	Absent
Symbrenthia niphanda Moore, 1872	-	-	Absent
Phalanta phalantha (Drury, [1773])	-	-	Absent
Telchinia issoria (Huebner, [1819])	-	Present	
Libythea lepita Moore, [1858]	-	-	Absent
Dodona durga (Kollar, [1844])	Present	Present	
Dodona dipoea Hewitson, 1866	Present	Present	
Dodona eugenes Bates, [1868]	Present	Present	
Dodona ouida Moore, 1866	-	-	Absent
Abisara fylla (Westwood, 1851)	-	-	
Acytolepis puspa (Horsfield, [1828])	-	-	Absent
Oreolyce vardhana (Moore, [1875])	-	-	Absent
Udara albocaerulea (Moore, 1879)	-	Present	
Celastrina argiolus (Linnaeus, 1758)	-	Present	Absent
Celastrina hugelii (Moore, 1882)	Present	Present	
Celastrina gigas (Hemming, 1928)	Present	Present	
Heliophorus sena (Kollar, [1844])	-	Present	
Shirozuozephyrus birupa (Moore, 1877)	-	Present	
Inomataozephyrus syla (Kollar, [1844])	-	Present	
Arhopala dodonea Riley & Godfrey, 1921	Present	Present	
Arhopala rama (Kollar, [1844])	Present	Present	
Arhopala ganesa (Moore, [1858])	Present	Present	

Spindasis nipalicus (Moore, 1884)	Present	Present	
Chaetoprocta odata (Hewitson, 1865)	-	-	Absent
Ancema ctesia (Hewitson, 1865)	-	-	Absent
Pratapa icetas (Hewitson, 1865)	-	-	Absent
Tajuria illurgioides de Niceville, 1890	-	-	Absent
Horaga onyx (Moore, 1858)	Present	-	
Chilaria kina (Hewitson, 1869)	-	-	Absent
Rapala manea schistacea (Moore, 1879)	-	Present	
Rapala selira (Moore, 1874)	-	-	Absent
Rapala nissa (Kollar, [1844])	-	Present	

Species that feed on climbers, that is, *Aristolochia dilatata* N.E.Br. for *Byasa* Moore, 1882 and *Atrophaneura* Reakirt, [1865] and *Smilax* for *Kaniska* Moore, 1899, were present in both years, although *Byasa polyeuctes* was absent in 2023 (Table 4). Of the 5 species that feed on parasitic plants, i.e. Loranthaceae, the Lycaenidae (*Ancema ctesia*, *Pratapa icetas* and *Tajuria illurgioides*) were entirely absent in 2009 and 2023, while of the two Pieridae, *Delias belladonna* was present in 2009 but not in 2023 and *D. sanaca* (Moore, 1857) was absent in 2009 but present at very low density in 2023.

Table 8 lists those butterfly species whose larval hostplants are unknown. It is likely that most of them feed on woody shrubs or trees, judging from closely related species or genera where the larval hostplants are known.

Table 8

Larval food plant unknown	**2009**	**2023**	**Absent in both years**
Auzakia danava (Moore, [1858])	-	Present	
Neptis mahendra Moore, 1872	-	-	Absent
Neptis sankara (Kollar, [1844])	-	Present	
Neptis ananta Moore, 1858	-	-	Absent
Neptis narayana Moore, 1857	Present	Present	
Argynnis childreni (Gray, 1831)	-	-	Absent
Euaspa milionia (Hewitson, 1869)	-	-	Absent
Shizuyaozephyrus ziha (Hewitson, [1865])	-	-	Absent
Thermozephyrus ataxus (Westwood, 1851)	-	-	Absent

Table 9

Quercus leucotrichophora and *Quercus floribunda* feeders	2009	2023
Sephisa dichroa (Kollar, [1844])	-	Present
Euthalia patala (Kollar, [1844])	-	Present
Shirozuozephyrus birupa (Moore, 1877)	-	Present
Inomataozephyrus syla (Kollar, [1844])	-	Present
Arhopala dodonea Riley & Godfrey, 1921	Present	Present
Arhopala rama (Kollar, [1844])	Present	Present
Arhopala ganesa (Moore, [1858])	Present	Present

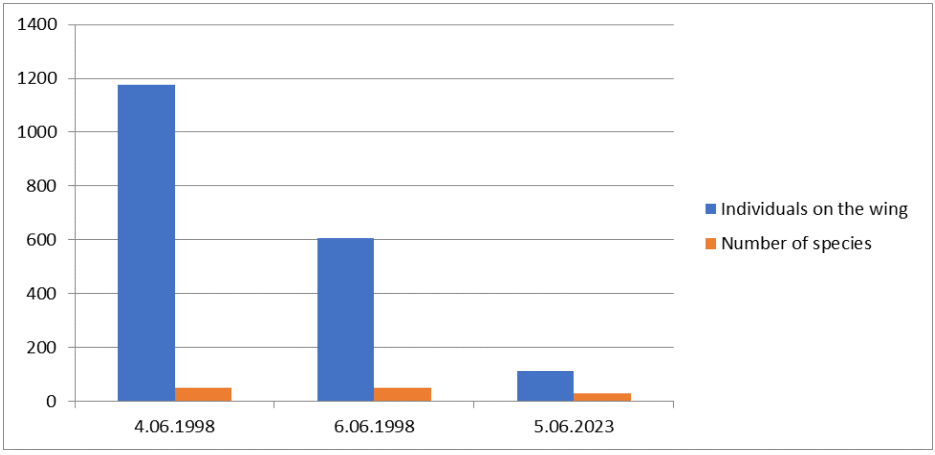

Figure 1. Showing number of individuals (blue) and species (brown) on the wing

Table 10

Year 2022	**Maximum temperature (^{0}C)**	**Minimum temperature (^{0}C)**	**Relative humidity %**	**Total rainfall (mm)**
January	10.86	9.54	77.36	106
February	12.06	10.65	68.44	72.4
March	21.13	19.10	52.05	0
April	26.27	24.37	34.34	0.8
May	24.52	22.75	65.82	58.2
June	26.96	24.79	62.98	2
July	24.90	23.77	86.62	N/A
August	24.40	23.26	87.91	68.8
September	22.96	21.71	87.44	28.6
October	19.27	18.05	78.26	2.6
November	16.20	14.58	69.09	0
December	14.24	12.34	62.51	2.2
Year 2023	**Maximum temperature (^{0}C)**	**Minimum temperature (^{0}C)**	**Relative humidity %**	**Total rainfall (mm)**
January	16.45	9.51	80.67	0
February	24.35	12.64	61.05	0
March	28.87	19.67	58.35	N/A
April	21.31	19.14	46.64	2
May	22.82	21.07	62.48	1.2

June	25.85	24.16	68.14	68.2
July	24.11	22.90	90.33	451.2

(Data in Table 10 indicates no winter rainfall in the first two months of 2023. Data has been taken from Jeolikote Forest Research Centre, Uttarakhand. Rainfall data for July, 2022 and March, 2023 is not available.)

CONCLUSION

From the above, it seems likely that the lack of precipitation during winter months can devastate butterfly communities at elevations of 1600-2400 m in the western Himalaya. The main reason as suggested by Smetacek (2011) might be desiccation of the pupae during the dry winter and following spring. However, there might equally well be a bouquet of causes and consequences relevant to El Niño years that result in the decimation of butterfly communities in this forest. Anecdotal personal observations from 2023 in other forests at similar elevation by other workers in Nepal, Sikkim and parts of Uttarakhand indicate a similar decimation of butterfly communities there, suggesting that this phenomenon is probably not restricted to Maheshkhan forest but widespread in the Himalaya.

Regarding the effect on appearance of species in El Nino years due to the type of host plant, it appears that butterflies using climbers as host plant are a bit less affected than those using other host plants, but the climber sample is rather small (2/3 versus usually <1/2 of the species present).

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ELEVEN NEW SATURNIIDAE SPECIES FROM INDIA AND ADJACENT COUNTRIES

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[3] 27th contribution to the knowledge of the Saturniidae of China (26th contribution: Nässig, W. A., Naumann, S., & Löffler, S. (2017): Revisional notes on the subgenera *Saturnia* (*Perisomena*) and *Saturnia* (*Neoris*) stat. rev. (Lepidoptera: Saturniidae). – Part B: *Neoris*. — *Nachrichten des entomologischen Vereins Apollo, Frankfurt*, N. F. 37 (4): 179–216.

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Reviewer: Jatishwor S. Irungbam

ABSTRACT

Nine new species of the family Saturniidae are described as new from northeastern India, Arunachal Pradesh: *Actias smetaceki* **n. sp.**, *Loepa melichari* **n. sp.**, *Loepa himalayana* **n. sp.**, *Cricula mishmica* **n. sp.**, *Sinobirma occidentalis* **n. sp.**, *Salassa dibanga* **n. sp.**, *Salassa occinica* **n. sp.**, *Solus pseudodrepanoides* **n. sp.**, and *Solus tawanga* **n. sp.**. In addition to these, we also name and describe two closely related species from adjacent countries: *Actias loeffleri* **n. sp.**, from Kachin State, Myanmar, and *Salassa linzhica* **n. sp.** from PR China, Tibet. Due to a mixed type series of *Loepa anthera* Jordan, 1911, a male lectotype is designated for that taxon from the collections of NHM London. *Solus loba* Lang, 2017, described as a subspecies of *S. parvifenestatus* Bryk, 1944, is raised to full species rank.

Keywords: Himalaya, Arunachal Pradesh, Tibet, Myanmar, Saturniidae, *Actias*, *Cricula*, *Salassa*, *Sinobirma*, *Solus*, new species, lectotype designation, status change.

INTRODUCTION

A large part of this study is based on material which came into the hands of the senior author by purchasing the Löffler collection some years ago. Among other material, it contains material from Arunachal Pradesh, collected earlier by G. Bretschneider and others. The specimens described from Tibet, China and Kachin State, Myanmar, originate from material either purchased from local collectors or was collected during expeditions by the senior author.

Preimaginal instars of all taxa described here remain unknown for the time being.

This article contains descriptions of nine new species from northeastern India, plus two descriptions of new taxa from Tibet and northeastern Myanmar, which are closely related to the new Indian taxa. All male holotypes and, where available to us, associated females are figured in colour, and the male genitalia structures of all new taxa are shown as well. In one case (*Loepa melichari*, **sp. n**.), it was necessary to fix the identity of another taxon by designating a lectotype.

Holotypes of the taxa described here from the collection of the senior author will be deposited within the Rainer Seegers Foundation in the collections of the Museum für Naturkunde in Berlin, Germany. Depositories of all paratype material are mentioned in the paratype lists. The preparation of specimens and genitalia structures follows standard procedures.

Our results are always based on all data available to our studies; morphological studies and other "non-molecular" characters such as zoogeographical or ecological aspects, while the additional molecular studies are only based on barcode data of the mitochondrial DNA of the cytochrome-*c* oxidase, subunit I gene (COI), received from the laboratory of the *Canadian Centre for DNA Barcoding* (CCDB) in Guelph, Ontario (Canada) (see Ratnasingham & Hebert 2007, 2013).

Collection abbreviations used:

CBRC: Collection Butterfly Research Centre, Peter Smetacek, Bhimtal, India.

CSLL: Collection Swen Löffler, Lichtenstein/Sachsen, Germany, since 2020 part of CSNB.

CSNB: Collection Stefan Naumann, Berlin, Germany. Dedicated to the Rainer-Seegers-Stiftung, to be deposited in MfN Berlin, Germany.

MfN: Museum für Naturkunde, Berlin, Germany.

NHMUK: The Natural History Museum, London, U.K.

Other abbreviations and conventions

BC mtDNA COI Barcode.

BIN Barcode Index Number (as downloaded in 2023); an automatically assigned identifier for genetic clusters within Bold, see Ratnasingham & Hebert (2013).

GP Genitalia dissection.

Descriptions

***Actias smetaceki*, n. sp. Naumann, 2023**

Holotype (Fig. 1a, dorsal view; Fig. 1b: ventral view): ♂ India, Arunachal Pradesh, probably Mishmi Hills, V.1990, leg. local collector. Coll. CSNB. — A red holotype label will be added accordingly. The holotype will be deposited within the Rainer Seegers Foundation in the collections of MfN, Berlin. The BOLD BIN Code is AEC3353.

Paratypes (in total 4 ♂♂, 1 ♀): 2 ♂♂, Same data as holotype. GP 2599/19; BC SNB 6372 & 6373; coll. CSNB. 1 ♀, Same data as holotype; BC SNB-RR 0265. coll. CSNB. 1 ♂, India, Arunachal Pradesh, road Roing – Hunli, 2277 m, Mayodia, 65 km Roing, N28°16'47'' E95°54'44'', 20.–21.V.2018; 1 ♂ same locality, 18.V.2019 leg. P. Smetacek, Coll. CBRC. – Blue paratype labels will be added.

Etymology: To name an Indian Saturniidae species after Peter Smetacek is an honour for the senior author, to express his admiration and appreciation of Peter's continued intense engagement for, interest in and knowledge of the insect fauna of the Indian subcontinent in so many different ways.

Description

Male (Figs. 1a & b): Length of forewing, measured from base to apex, 45 – 48 mm (holotype 45 mm).

Antennae ochreous brown, quadripectinate, of 13.0 mm length, with 29 segments, longest rami 2.8 mm. Head, thorax, abdomen white, wings with light bluish white ground colour, collum and forewing costa dark carmine inwardly edged with black. Legs with light carmine tibiae and tarsi.

Forewing slender and elongate, apex almost right angled. The only ornamentations are the central ovoid ocellus and an obscure zigzag postmedial line. The ocellus with a maximum diameter of 3.0 – 3.5 mm, has from basad to marginal a black, light blue, pink, clear, broader yellow and grey portion. The light greyish postmedian line has extensions towards the margin between the veins. All veins accentuated, marginal fringe yellow.

Hindwing with long tail, ground colour as for forewing, with a length of 74 – 75 mm, measured from wing base to tip of the tail. Ornamentation similar to forewing, ocellus with 4.0 – 5.1 mm maximum diameter, and with same sequential arrangement of colours as on forewing. The postmedian line is only visible from upper margin to the veins which end in the tail part of the wing. Marginal fringe of the main part of the wing yellow.

On ventral side, thorax and abdomen white, and wings of the same ground colour as dorsal surface. Ornamentation is the same as on dorsal side, but both fore- and hindwing ocelli with only an obscure proximal black line, followed by broader pink and creamy yellow portion. Postmedial zigzag line more heavily marked than on dorsal side. Hindwing anal marginal area clothed with long white hairs.

Male genitalia (Figs. 20a – e; GP 2599/19 SNB): Uncus with one long central process, apically fused to a cupola-like structure. Gnathos with strongly sclerotized and bent ventrolateral processes. The dorsal valve process broad-based, its ending slenderer and more rounded, ventral process round, strongly sclerotized on its margin. Juxta with two short, apically rounded lateral processes, saccus bent backward, relatively long and broad. Aedeagus ending with a dentate left ventrolateral structure where the vesica emerges.

Female (Figs 2a & b): Differences from the male are mainly the typical sexual dimorphic characters, such as slenderer antennae, larger abdomen, more rounded fore- and hindwings with a larger wing surface. The colour and ornamentation are similar to the male. Antennae ochreous brown, quadripectinate, of 9.5 mm length, with 26 segments, longest rami 1.2 mm. Forewing length of the single known female 46 mm, hindwing length, measured again from wing base to tip of the tail 69 mm. The dorsal postmedian line only slightly visible, on ventral side broader than in the males.

Distinctive characters and discussion: Peter Smetacek discovered this species in the Mishmi Hills, Arunachal Pradesh: thanks to his material it is possible to know at least one locality for this species, the original material in Coll. SN lacked locality and flying time data and therefore lay undescribed for many years.

Within the complex of conifer-feeding Asian *Actias* Leach, 1815 species around *A. felicis* (Oberthür, 1896), there is a group of taxa with very similar genitalia structures comprising *A. winbrechlini* Brechlin, 2007 from China, Yunnan, *A. peggyae* Brechlin, 2017 from China, Tibet, and the two new taxa described here, *A. smetaceki* **n. sp**. from India, Arunachal Pradesh, and *A. loeffleri* **n. sp**. from Myanmar, Kachin State, described below. All of them bear a rather angular lower forewing margin, and in male genitalia structures a typical fused uncus with one central projection in combination with large rounded, lobe-like ventral processes of the valves. *A. smetaceki* n. sp., the smallest species in this group, has more similarities in male genitalia structures with *A. peggyae*, such as the relative compact ventral processes of the gnathos and the broad and more rounded lateral processes of the juxta, but differs from that species by the different form of the cupola-like uncus. *A. winbrechlini* and *A. loeffleri* **n. sp**., described below share the more slender processes of the gnathos but differ by the form of their uncus, valves and juxta processes. All four species have different BOLD BIN Codes.

Actias winbrechlini Brechlin, 2007 was figured misidentified as *A. chrisbrechlinae* Brechlin, 2007 by Wu (2017: 88ff.), presenting nicely the preimaginal instars originating from Kunming env., Yunnan, where it was reared on *Cedrus deodara*.

***Actias loeffleri*, n. sp.**

Holotype (Fig. 3a, dorsal view; Fig. 3b: ventral view; Figs. 21, 22): ♂, Myanmar (NE), Kachin State, road Kanphant – Mt. Inwa Bum, near pass, N26°10’31.9’’ E98°30’03.4’’, 3008 m, 26.V.2006, 20.45h., leg. S. Naumann, S. Löffler, & S. Langer; BC SNB-RR 0107; coll. CSNB.

— A red holotype label will be added accordingly. The holotype will be deposited within the Rainer Seegers Foundation in the collections of MfN Berlin. The BOLD BIN Code is AAJ6377.

Paratypes (in total 17 ♂♂): 5 ♂♂, same locality and collectors as holotype, but with dates: 26.V.2006, 21.25h, 21.40h, 21.45h, 23.25h and 28.V.2006, 0.20h; BC SNB 1505, all coll. CSNB. 5 ♂♂, same locality and collectors, 26.–27.V.2006; BC SNB 3895 & 3896; coll. CSLL, bought 2020, coll. CSNB. 1 ♂, Myanmar, Kachin State, Imaw Bum Mts. [sic], 2660 m, 31.V.–3.VI.2002, leg. Y. Watanabe; received VII.2002 from Yasuyuki Watanabe; GP 944/03 SNB; BC SNB 4933; coll. CSNB. 3 ♂♂, Myanmar, Kachin State, Chudu Razi Hills, 30 miles E Kawnglangphu, 7., 14., & 15.VI.2007, leg. Local collector, received in exchange from Adam M. Cotton; coll. CSNB. 2 ♂♂, same locality, 18.VI.2007; coll. CSLL, bought 2020, coll. CSNB. 1 ♂, Myanmar, Kachin State, Chudu Raji, 2800 m, VIII.2004, leg. Local collector, received XI.2005 from Kiyotami Fukinuki; GP 1388/04 SNB; coll. CSNB. – Blue paratype labels will be added.

Etymology: This beautiful species is named after Swen Loeffler, longtime companion of the senior author during several, sometimes strenuous expeditions to remote areas in Myanmar in recognition of his friendship. His moth collection was purchased by the senior author.

Description

Male (Figs. 3a & b): Length of forewing, measured from base to apex, 47 – 52 mm (holotype 52 mm).

Antennae ochreous brown, quadripectinate, of 13.5 mm length, with 29 segments, longest rami 3.1 mm. Head, thorax, and abdomen white, with a yellowish shade on the thorax beside the collar, collar and forewing costa dark reddish carmine with a narrow inner black margin. Legs with light carmine tibiae and tarsi.

Wings with light bluish green ground colour. Forewing slender and elongate, outer margin erect. The only ornamentations are the central, completely round ocellus and an obscure zigzag postmedial line. The ocellus with 4.1 – 5.0 mm maximum diameter has from basad to marginal a broad black, small white, intense pink, clear, broader whitish pink and tiny grey portion. The light greyish postmedial line has extensions towards the margin between the veins. All veins accentuated, marginal fringe yellow.

Hindwing with long tail in ground colour, with a length of 74 – 88 mm, measured from wing base to tip of the tail. Ornamentation similar as on forewing, the little ovoid ocellus with 5.0 – 5.5 mm maximum diameter, and with same sequential arrangement of colours as on forewing. The postmedial line is only visible from upper margin to the veins which end in the tail part of the wing. Marginal fringe of the main part of the wing yellow.

On ventral side thorax and abdomen white, and wings as well in ground colour. Ornamentation is the same as on dorsal side, both fore- and hindwing ocellus with same colour sequence as on

dorsal side, but black portion narrower whereas the white portion is broader. Postmedian zigzag line more intense than on dorsal side, and on the forewing followed by a portion of grey scales in the apical third of the postmedian area. Hindwing anal marginal area clothed with long white hairs.

Male genitalia (Figs. 21, 22; GP 944/03 & 1388/04 SNB): Uncus with one long central process, apically ending with acute tip. Gnathos with long, slender and almost straight ventrolateral processes. The dorsal valve process with slender base, ending even more slender and rounded, ventral process round. Juxta with two apically rounded lateral processes, the right one a little longer than the left one, saccus relatively long and slender. Aedeagus ending with a small triangular dentate left ventrolateral structure before the vesica emerges.

Female: Unknown.

Distinctive characters and discussion: Some distinctive characters were already mentioned in the description of *A. smetaceki* **n. sp**. above. *A. loeffleri* **n. sp**. is the largest species in the complex, and differs from *A. winbrechlini* aside of the little larger size in some details of the ocellus colouration and male genitalia with its acute tip of the uncus, very slender and long lateral processes of the gnathos, even more slender dorsal processes of the valves, a longer saccus, and longer, apically little rounded lateral processes of the juxta.

It is immediately distinguishable from *A. smetaceki* **n. sp**. by the round forewing ocellus, which is oval in *A. smetaceki*.

Brechlin mentioned in his 2007 paper that *A. winbrechlini* would occur in Eastern Myanmar as well but gave no information from where he had this knowledge nor did he mention any locality data for Myanmar; this was a misinterpretation as he apparently had no material from there, and based his assertion on the information that in Kachin State, an *Actias* species of the *felicis*-group would likely occur. He clearly referred to *A. loeffleri* **n. sp**., which we have described here. Racheli (2008) repeated this note but gave some exact data for material from Myanmar from his collection.

***Loepa melichari*, n. sp.**

Holotype (Fig. 4a, dorsal view; Fig. 4b: ventral view; Fig. 23): ♂, India, Arunachal Pradesh, "Namdafa" "V.2007"; BC SNB 7302; ex coll. CSLL, coll. CSNB. — A red holotype label will be added accordingly. The holotype will be deposited within the Rainer Seegers Foundation in the collections of MfN Berlin. The BOLD BIN Code is AEG3182.

Paratypes (in total 3 ♂♂, 1 ♀): 3 ♂♂, same data as holotype, with GP 2847/22 SNB, BC SNB 7303; coll. CSNB. 1 ♀, paralectotype of *Loepa anthera* Jordan, 1911; Digboi, Assam, L. Brunt;

NHMUK 014203927; Syntype [blue margin]; coll. NHMUK London. – Blue paratype labels will be added.

Etymology: *L. melichari*, n. sp. is named after our friend Tomas Melichar, in recognition of our friendship and of his extensive contribution to the knowledge of Indian Sphingidae.

Description

Male (Figs. 4a & b): Length of forewing, measured from base to apex, 55 – 60 mm (holotype 60 mm).

Tegulae, main part of the thorax and abdomen intense dark yellow. Collar and medial part of the thorax dark grey. Wings with the intense dark yellow ground colour and bright orange and pink ornamentation as is typical for the closely related *L. anthera*. The antennae light ochreous brown, quadripectinate, only last 12 segments bipectinate or with completely reduced pectination, 11.0 mm in length, 34 segments in total, longest rami 1.5 mm long.

Forewing elongate, apex almost right angled with rounded tornus, the outer margin almost straight. On dorsal side the antemedial field and lower half of the medial area pink, merging into more orange colour towards the marginal zone, antemedial line dark grey. The almost crescent shaped ocellus separated from the dark grey costa by a narrow black arc. It has a vertical maximum diameter of 10 – 12 mm (holotype 12.0 mm), and is of orange-brown colour, with internal white semicircle and vertical curved black line with light marginal shade representing the pupil of the ocellus. To marginal side there are two triangular extensions, touching the grey very undulate medial line, at its end the costal margin turning from grey to yellow. The two undulate bluish grey postmedial lines are interspersed and marginally followed by a violet portion, in the apical area light pink with marginal white zigzag line and subapical black dot in the form of a halfmoon, with some proximal blue scales. The prominent submarginal line white, with small extensions along the wing venation, embedded in a dark orange yellow zone. Cilia olive yellow.

Hindwing antemedial line black, becoming broad and pink near the dorsum. Hindwing ocellus of same form and colours as on forewing, the light marginal shade wider than on forewing. It has a vertical maximum diameter of 8.0 – 9.5 mm. Pink and orange portion of the forewing missing, the ornamentation and colours similar.

On ventral side frons darker yellow, thorax and abdomen with yellow ground colour, all legs pink; abdomen with two lateral rows of grey dots. On the forewing the pink and orange portion of the dorsal side is missing, and the ocellus is reduced to a halfmoon-like structure with a vertical maximum diameter of 5.0 – 5.5 mm, coloured violet brown with central slender black line. Pattern otherwise as on dorsal side. Hindwing antemedial line completely black, ocellus with bluish wide proximal line, and submarginal zone dark olive, otherwise as on dorsal side.

Male genitalia (Fig. 23: GP 2847/22 SNB): Uncus bifid on its tip, and with small indention on its ventral margin. Dorsal process of the valves not as rounded as in the structures of *L. anthera*, with a more rectangular form; internal process round, ventral process broad-based and shorter than in *L. anthera*. Juxta with two short lateral lobes. Saccus long and broad. The aedeagus very similar to that of *L. anthera*, little more compact, vesica with three lobes, two of them, the left dorso- and ventrolateral ones, with small dentate sclerite. The genitalia structures were compared with those of topotypical *L. anthera* from northern Vietnam, Nghe An Province (GP 2848/22 SNB) in coll. Naumann.

Female (Figs 5a & b): The single known female, the paralectotype of *L. anthera* itself, is very similar to the males in all characters, and differs from those only by some sexual dimorphic characters such as different structure of antennae and more rounded wings. It has a forewing length of 66 mm, the forewing discal spot has a diameter of 11.0 mm, that of the hindwing of 10 mm. The antennae are 12.0 mm long, completely bipectinate, there are 37 segments, the longest rami are 1.0 mm long.

Distinctive characters and discussion: *Loepa melichari*, **n. sp**. is easily distinguished from most other members of the genus by its colourful wings with pink portions, which is a rare feature in the genus, so far known only in the two closely related species *L. anthera* Jordan, 1911 and *L. oberthuri* (Leech, 1890). It can be separated from the superficially very similar *L. anthera* by its smaller size in general, details of pattern such as the more proximal medial line, slenderness of the wing ocelli, a darker postmedial band on the hindwing, more intense dark pattern on the ventral side, and some details in the male genitalia structures (longer processes of the uncus, more extruded dorsal valve process, rounded internal process, broader and shorter ventral process, and more compact saccus).

Loepa anthera itself was described after two syntypes with different localities, both stored in NHMUK London, a male with data: *Loepa anthera* Type, 1911, Jord., Nov. Zool. [handwritten, Jordan]; Tonkin; Syntype [blue margin]; NHMUK 014203926; and a female with data: Digboi, Assam, L. Brunt; Syntype [blue margin]; NHMUK 014203927 (Fig. 5a & b). Thereby it is obvious, that *L. anthera* has a mixed type series. To stabilize nomenclature, we hereby designate the male syntype as lectotype of *L. anthera* which fixes the identity of the species to the Vietnamese population which is widespread in that country, but also in southern China, with a few records from Laos and northern Thailand. No representative of either *L. anthera* or *L. melichari*, n. sp. are known from Myanmar. The female paralectotype of *L. anthera* is designated here as single known female also as a paratype of *L. melichari*, n. sp. which is so far known only from northeastern Assam and the southeastern part of Arunachal Pradesh in India.

The third taxon in this group of colourful large *Loepa* Moore, 1859 species, *L. oberthuri*, described from Ichang (today: Yichang, Hubei Province, PR China) has an even wider wingspan than the two species mentioned above, and is easily separable by its large salmon-pink portion on both fore- and hindwings and the huge apical bluish black dots at the forewing apex. It occurs in central and southern China. A specimen mentioned in its original description

originating from “Cochin China” [today Vietnam] from the collection of Ch. Oberthür is probably a misidentified *L. anthera*; no specimens of *L. oberthuri* are known from Vietnam. Similar with the situation of the type series of *L. anthera*, there was also in this taxon the possibility of a mixed type series, and to avoid misinterpretations of the identity, a lectotype was already designated by Brosch *et al*. (1999).

***Loepa himalayana*, n. sp.**

Holotype (Fig. 6a, dorsal view; Fig. 6b: ventral view): ♂, India, Arunachal Pradesh, Dist. Along, near Rapum, N28.53176° E94.24941°, 2000 m, 17.–21.IX.2006, leg. Gil Bretschneider, coll. CSLL; BC SNB 4873; collection purchased in 2020; coll. CSNB. — A red holotype label will be added accordingly. The holotype will be deposited within the Rainer Seegers Foundation in the collections of MfN Berlin. The BOLD BIN Code is ACC1700.

Paratypes (in total 30 ♂♂, 2 ♀♀): 6 ♂♂, same data as holotype, with BC SNB 4874 & 4876; coll. CSNB; 5 ♂♂, India (NE), Arunachal Pradesh, Mishmi Hills, Lower Dibang Valley District, Mayudia, 1900 m, 24.–25.IX.2006 leg. Gil Bretschneider, coll. CSLL; GP 2733/21 SNB; coll. CSNB. 1 ♀, PR China, Tibet, Yigong, ca. 30°30’N 94°80’E, 2300–2400 m, V.–IX.1996 ?, leg. Wang, bought X.1996 from Huang Hao, Quingdao; BC SNB 0798 [no result]; coll. CSNB. 13 ♂♂, 1 ♀, PR China, Tibet (Xizang Zizhiqu), Nyingchi Pref., Bomi – Pailung, ca. 30°02’N 95°01’E, 2000 m, VI.–VIII.2012, leg. Yang Yang, bought VI.2014 from Yang Yang, Beijing; GP 2732/21 SNB (♂); BC SNB 5498 (♀); coll. CSNB. 1 ♂, PR China, Tibet (Xizang Zizhiqu), Linzhi area, Motuo, Hanmi, 2200 m, VII.–VIII.2013, bought III.2019 from Yang; coll. CSNB; 1 ♂, PR China, Tibet (Xizang Zizhiqu), Motuo (Metok) County, Duoxiongla valley, Hanmi, 29°21’N 95°07’E, 2120 m, VIII.2013, leg. Yunkang Hu, bought X.2013; coll. CSNB. 1 ♂, PR China, Tibet (Xizang Zizhiqu), Motuo County, Duoxiongla valley, 2000 m, VII.–IX.2016, leg. Yang, material bought 2020 from Yang; coll. CSNB. 3 ♂♂, PR China, Tibet (S) (Xizang Zizhiqu), Motuo County, Hanmi, Duoxiongla valley, 2000 – 2200 m, VIII.2017, leg. Yang, bought 2018 & 2020 from Yang; GP 2737/21 SNB; BC SNB 6400 & 6401; coll. CSNB. – Blue paratype labels will be added.

Etymology: *Loepa himalayana*, **n. sp**. is named for its solely Himalayan distribution in northeastern India and southern Tibet.

Description

Male (Figs. 6a & b, 8a & b): Length of forewing, measured from base to apex, 49 – 66 mm (holotype 62 mm), the Tibetan specimens being smaller on average.

Head, thorax, abdomen and wings with bright, light yellow ground colour and typical pattern for the genus *Loepa*. Collar grey with greyish violet border to the thorax, tegulae yellow. The antennae ochreous brown, quadripectinate, only last 6 segments bipectinate or with completely

reduced pectination, 13.0 mm in length, 32 segments in total, longest rami 1.8 mm long. Legs light pink, with black claws.

Forewing elongate, apex somewhat produced with rounded tornus, the outer margin concave. Antemedial line of intense carmine. The ovoid forewing ocellus of 5.5 – 7.5 mm maximum diameter (holotype 7.0 mm), orange-brown, separated from the costa by a narrow, sharply defined black semicircle, followed distally by a narrow yellow and then pinkish white line and a vertical pale line representing the pupil of the ocellus. Costa grey until the medial line, beyond which it is yellowish grey as far as the distal double black postmedial lines. Beyond that there is a pinkish grey subapical patch crossed by the outer of the two postmedial black lines, which is white as it crosses this patch, marginal portion of the patch more orange. Below that a black subapical speck with some intense carmine suffusion around it. The erect submarginal line white, interrupted along the wing venation, embedded in yellowish olive patches. Marginal fringe yellow.

Hindwing antemedial line greyish black, turning to carmine near the dorsum. Hindwing ocellus almost round, of 5.5 – 7.2 mm diameter (holotype 6.2 mm), without the black proximal semicircle of the forewing ocellus, but otherwise with same sequential arrangement of the colours. Undulate dark grey medial line and double postmedial lines, proximal one dark grey, marginal one bluish, submarginal area as in forewing.

On ventral side frons darker yellow with carmine tip, thorax and abdomen with yellow ground colour. On the forewing the grey antemedian line is obscure. In both the fore- and hindwing ocelli the black semicircle is followed by some bluish scales, and the orange brown colour is missing, giving them a faded and more pinkish impression. Hindwing with black antemedial line. The postdiscal and marginal markings as on dorsal side.

Male genitalia (Fig. 25, GP 2733/21 SNB from India; Fig. 26, GP 2732/21 SNB from Tibet): Uncus long, acute and fused up to its tip. Dorsal process of the valves longitudinal and rounded, the ventral process acute, long and small-based. Both processes are connected with an internal longitudinal vertical protuberance with a rectangular dorsal end. Sacculus distinctive, saccus long, bulb-like, with rounded end, juxta rounded, on ventral side elongated with an internal process. The aedeagus of around 5 mm length, with two left and right lateral sclerotized processes at its end; the vesica emerging to dorsal side, with four left and right large dentate sclerites.

Female (Figs 7a & b): The single known female is very similar to the males in all characters and differs from those mainly by some sexual dimorphic characters such as different structure of antennae, broader abdomen, and more rounded wings. The medial line is somewhat more undulate, the inner of the two postmedial lines is suffused with some blue and carmine scales, and the outer one is broader bluish. The female has a forewing length of 57 – 61 mm, the ovoid forewing discal spot has a diameter of 8.5 mm, that of the hindwing of 7.0 mm. The antennae

are 14 mm long, completely bipectinate, there are 34 segments, the longest rami are 1.1 mm long.

Distinctive characters and discussion: The here described *L. himalayana,* **n. sp**., *L. miranda* Atkinson *in* Moore, 1865 and *L. macrops* Naumann & Smetacek, 2019 form a group of closely related species, occurring in the Himalayan and sub-Himalayan areas of Tibet and Arunachal Pradesh (*L. himalayana,* **n. sp**. with BOLD BIN Code ACC1700), Sikkim, Darjeeling, eastern Nepal and western Bhutan (*L. miranda* with BOLD BIN Code AAB0772), and central to western Nepal, Uttarakhand and Himachal Pradesh (and perhaps further westward) (*L. macrops* with BOLD BIN Code AAB0779). *L. macrops* easily can be separated already by external morphology from the here described taxon by its much larger wing ocelli (for which it is named) plus by details of the male genitalia structures such as form of the processes of the valves and number of sclerites on the vesica (see figures in Naumann & Smetacek, 2019). *L. miranda* resembles much more the here described taxon, but differs by an intense black basal semicircle of the forewing ocellus, less elongate forewings, and in the male genitalia structures by a more triangular dorsal process of the valves and less sclerites on the vesica.

We follow with the authorship of *L. miranda* the interpretation of Naumann & Nässig (2010) or Naumann *et al*. (2012), and cite Atkinson as author of the taxon, similar to some other Saturniidae taxa, and with same reasons as mentioned in the 2010 work, and do not follow Brechlin & Kitching (2010) who gave only Moore as author.

***Cricula mishmica*, n. sp.**

Holotype (Fig. 9a, dorsal view; Fig. 9b: ventral view): ♂, India, Arunachal Pradesh, road Roing – Hunli, 1440 m, 17.–18.V.2009, leg. Bretschneider; GP 2718/21 SNB; BC SNB 6377; coll. CSNB. — A red holotype label will be added accordingly. The holotype will be deposited within the Rainer Seegers Foundation in the collections of MfN Berlin. The BOLD BIN Code is ADR1603.

Paratypes (in total 31 ♂♂): 18 ♂♂, same data as holotype, with BC SNB 6318, 6376, 6378, 6384, 6385; coll. CSNB; 13 ♂♂, India, Arunachal Pradesh, Mishmi Hills, above Roing, 1450 m, V.1990, leg. Wankhar; GP 2717/21; coll. CSNB. – Blue paratype labels will be added.

Etymology: This new species is named after its type locality.

Description

Male (Figs. 9a & b, 10a & b): Length of forewing, measured from base to apex, 28.5 – 35 mm (holotype 33 mm).

Head, thorax, abdomen and wings with intense orange-brown ground colour and dark greyish black markings, with typical pattern for the genus *Cricula* Walker, 1855. Collum in ground colour. The antennae light ochreous brown, quadripectinate, only last 3 segments bipectinate, 8.5 mm in length, with 20 segments in total, longest rami 1.8 mm long.

Forewing almost rectangular with apical tip bent outward, the outer margin strongly concave. Antemedial and medial area in ground colour, the antemedial zigzag line slender, medial area with a variable number of ocelli and/or dark grey patches of variable size. All specimens bear a drop-like fenestrum with narrow grey margin at the marginal end of the cell between basal vein M_1 and CuA_1 (nomenclature following Scoble, 1995); most specimens bear a second fenestrum or grey dot near the costa, and some have a third fenestrum or dot in between, and very few even a fourth dot or tiny window proximal to the first one. The variability with one (paratype) and four fenestra (holotype) is shown in our figures. The grey postmedial line is almost straight, turning little bent into the apical costal area. The postmedial area darker violet grey than ground colour, with lighter area around the tornus. Marginal fringe white.

Hindwing completely in ground colour, the grey antemedial line without indentions, the postmedial line dentate, approaching each other or in some specimens even connected near the upper wing margin. One central round fenestrum with grey margin in the medial area.

On ventral side thorax with legs and abdomen in ground colour. Both on the fore- and hindwing the antemedial and medial zone lighter, suffused with violet-whitish scales, the postmedial zone in the more intense ground colour of dorsal side. The area below cell yellowish, without dark suffusion. Both ante- and postmedial lines reduced, the apical two thirds on fore- and hindwing more violet than grey. Marginal fringe white.

Male genitalia (Fig. 27; GP 2718/21 SNB): Uncus strongly sclerotised at its tips, with two short lateral triangular processes and deep furcation. Gnathos almost rectangular, with rounded edges. There are two short, little rounded dorsal tips of the valves, the sacculus is quite broad. Juxta with two lateral lobe-like, triangular processes with short dentation on their tips, and a ventral rounded sella with central furcation. The saccus short, broad and triangular. The aedeagus has a sclerotised portion on dorsal side, the vesica is short and has four bulbs with one large sclerotised spine each on their tips, all in almost same size.

Female: Unknown.

Distinctive characters and discussion: *C. mishmica*, **n. sp.** forms with *C. flavoglena* Zhu & Wang, 1993 from Yunnan Province, China, *C. aungsansukyiae* Naumann & Löffler, 2010, from Kachin and Sagaing States, Myanmar, and *C. gandhii* Naumann & Löffler, 2013, from India, Arunachal Pradesh a small group of species within the genus with most similarities in male genitalia structures (form of uncus, gnathos, valves and four sclerites on the vesica; figures in Naumann & Löffler 2010, 2013), and those four taxa are also near to each other in the neighbour joining tree downloaded from the BOLD website. *C. gandhii* which occurs partly

sympatrically with *C. mishmica*, has a greater forewing length, different, darker ground colour and in male genitalia a different form of the juxta processes and the vesica.

***Sinobirma occidentalis*, n. sp.**

Holotype (Fig. 11a, dorsal view; Fig. 11b: ventral view): ♂, India (NE), Arunachal Pradesh, Ziro, Pange valley,1850 m, 17.VI.2007, 3.30h, leg. Bretschneider; GP 2624/19 SNB; BC SNB 6323; coll. CSNB. — A red holotype label will be added accordingly. The holotype will be deposited within the Rainer Seegers Foundation in the collections of MfN Berlin. The BOLD BIN Code is ADQ8860.

Paratypes (in total 3 ♂♂, 4 ♀♀): 3 ♂♂, 4 ♀♀, same locality as holotype, collected 12.–17.VI.2007 1 ♀ with BC SNB 6324; coll. CSNB – Blue paratype labels will be added.

Etymology: The new *Sinobirma* species is named after its westernmost distribution within the genus. The three already known taxa originate from Kachin and Sagaing State in northern Myanmar, Yunnan province in China, southeastern Tibet, and northeastern Arunachal Pradesh, India (overview in Rougerie, 2003 and Rougerie *et al*., 2012).

Description

Male (Figs. 11a & b): Length of forewing, measured from base to apex, 41 – 44 mm (holotype 42 mm mm).

Head, thorax, abdomen and wings with light yellow ground colour and typical pattern for the genus *Sinobirma*, the wings with scattered grey scales. Collum and tegulae yellow. The antennae olive-ochreous, bipectinate, the pectination much reduced on the 2 apical units, 10.0 mm in length, 35 segments in total, longest rami are around 2.0 mm long. The rami are situated in longitudinal direction on the antenna, turning to the tip, and are little bent to ventral side. Legs greyish carmine, with yellow hairs.

The forewing rounded, with almost right-angled lower angle and similarly angled apex, the latter with a small apical tip. The forewing with the following pattern elements on the otherwise homogenous wings on dorsal side, which consistently differ in detail from those of other *Sinobirma* species: Costa with grey shade in the basal half, the crenulate antemedial line chestnut brown and almost invisible, and the median band grey, undulate in the basal half, but straight in the costal half, touching the basal side of the forewing fenestrum which is drop-like, almost rounded, with 2.8 mm maximum diameter, and has a chestnut brown and grey margin. Postmedial line almost straight, broad, and of chestnut- brown colour. Postmedial area entirely in ground colour. Marginal fringe yellow.

Hindwing grey antemedial line slightly indicated, the grey medial line broad and intense dark grey, touching the ocellus at its basal margin. Ocellus round, with broad black outer circle, with a maximum diameter of 4.0 mm. Postmedial line slight, crenulate, and of chestnut brown colour. Postmedial area with a row of tiny grey dots between the veins. Marginal fringe yellow.

On ventral side somewhat lighter ground colour, and the pattern differs in the following characters: The forewing medial line is more curved, little crenulate, and is situated marginally to the ocellus. Both fore- and hindwing ocellus have the black margin circled with a chestnut brown external circle, and both fore- and hindwing bear a row of grey dots in the postmedial zone. Otherwise, similar to dorsal side.

Male genitalia (Figs. 28 & 29; GP 2624/19 & 2912/23 SNB): Uncus as in *S. malaisei* Bryk, 1944 and *S. bouyeri* Naumann *et al*., 2012, with two rounded dorsal processes with a slight dorsal indention, and a disto-ventral hook-like tip. The median processes of the gnathos are not fused in the centre and club-like, strongly sclerotized. The two knob-like protuberances at the dorsal basis of the valves are not connected with this structure, but are lateral ends of the gnathos. Valves with a well-developed harpe and two relatively acute apical processes. Juxta with lateral small rounded processes. Aedeagus with vesica emerging left lateral, the vesica has a very small apical sclerite. The 8th sternite with two quite acute processes, originating widely separated with round indention in between, and basally not sharing a mutual prolongation of the sternite. The sclerotisation of the 8th tergite slightly narrow in shape, median indention broad and not very deep.

Female (Figs 12a & b): Again, the female is very similar to the males, with few differences: The ground colour on dorsal side is a little more intense yellow, the colouration of antemedial and medial line is somewhat darker, the medial line even a little crenulate, the forewing postmedian area has a chestnut brown hue aside of the apical part and contains a row of darker chestnut brown dots. As in the male, the straight postmedian line ends at the costa before the apex. The wing ocelli are round and larger than in males, with a maximum diameter of 5.0 mm. Ventral side as in males, the postmedial area in ground colour. The forewing median line again is not a reflection of that of the dorsal side, it is situated posterior to the forewing ocellus and very wavy. The female has some more differences due to sexual dimorphism: The wings are somewhat more compact, still with almost right-angled apex, the forewing length, measured from base to apex, is 46 – 48 mm. The antennae have much shorter rami (still bipectinate) of around 0.6 mm length, are 9.0 mm long and have 37 segments, and the body mass is typically more compact.

Distinctive characters and discussion: *Sinobirma occidentalis*, **n. sp.** is smaller than *S. 62alaise* and *S. myanmarensis* Naumann *et al*., 2012, but larger than *S. bouyeri* which occurs also in Arunachal Pradesh. It has almost the same ornamentation as *S. myanmarensis* (situation of the medial line in comparison to the ocellus, form and colour of the postmedial line) but differs from that species, aside from much smaller size, by the dark grey portion of the ocellus ring (carmine in *S. myanmarensis*). The smaller males of *S. bouyeri* have less intense pattern

structures and are more homogenously coloured. The markings of this species (e.g. medial line) are situated in different positions. The apical processes of the valves in male genitalia of *S. occidentalis* are unique in their form.

***Salassa dibanga*, n. sp.**

Holotype (Fig. 13a, dorsal view; Fig. 13b: ventral view): ♂, India, Arunachal Pradesh, Mishmi Hills, 2600 m, IV.1990, leg. Wankhar. — A red holotype label will be added accordingly. The holotype will be deposited within the Rainer Seegers Foundation in the collections of MfN Berlin. The BOLD BIN Code is AEF2584.

Paratypes (in total 8 males, 9 females): 5 ♂♂ 5 ♀♀: India, Arunachal Pradesh, Mishmi Hills, 2300 m, IV.,V., VII. 1990, leg. Wankhar; BC SNB 6624 & 6625; GP 2725/21 SNB; BC SNB 7287; GP 2731/21 SNB; BC SNB 6457; GP 2798/22 & 2799/22 SNB; BC SNB 7299 & 7300; Coll. CSNB. 3 ♂♂ India, Arunachal Pradesh, road Roing – Hunli, km 65, 28°16’47’’N 95°54’45’’E, 2306 m, 20.IV.2021, 29.IV.-10.V.2019, IV.2022, 4 ♀♀: same locality, 19.IV.2021; 23.IV.2021 x2 specimens, 24.IV.2021, leg. P. Smetacek; BC SNB 7298; coll. CBRC – Blue paratype labels will be added.

Etymology: The new taxon is named after distribution in the Dibang area in northeastern Arunachal Pradesh.

Description

Male (Figs. 13a & b): Length of forewing, measured from base to apex, 50 – 55 mm (holotype 55 mm).

Head, thorax, abdomen and wings with dark greyish brown ground colour, wings suffused with fuscous orange-brown scales, the complete thorax and basal part of the wings covered with hair-like scales. Antennae chestnut brown, completely quadripectinate, 15.0 mm in length, with 38 segments, longest rami 2.0 mm.

Forewing almost rectangular, apex with somewhat acute tip, tornus rounded. Antemedial and medial area in ground colour, separated by an indistinct black antemedial line with white proximal shade. Forewing fenestrum with green transparent centre, little rounded to proximal side, with upper and lower acute tip and acute extension to marginal side. Postmedial fuscous line almost straight, with costal part being orange, and with 6 to 7 small hyaline patches between the veins. Postmedial area in the proximal half dark brown, ending violet in the apical area, marginal half in ground colour. Marginal fringe brown.

Hindwing with black antemedial and postmedial line, connected with a semicircle to each other near the upper wing margin and circling the eyespot with black pupilla and transparent

halfmoon-like vertical thin structure, with white and outer orange-red ring, this with a maximum diameter of 8.0 – 9.5 mm (one specimen with barcode SNB 2799 known with much reduced eyespot of only 6.0 mm diameter). The eyespot surrounded by light greyish-brown zone. The black postmedial line is followed marginally with a greyish violet portion, suffused with olive scales, a dark grey submarginal line, and the outer submarginal zone in uniform ground colour. Marginal fringe brown.

On ventral side thorax, abdomen and legs covered with long, dark brown hair. Both fore-and hindwings up to the postmedial line dark brown without any ornamentation, suffused with white hairs in the basal part, the only pattern are the transparent parts of the ocelli and fenestra. Postmedial line consisting of a row of hyaline vertical patches, followed by an inner violet part of the postmedial area in the proximal two thirds, separated with a broad dentate line from the marginal olive area. The area below the cell paler brown.

Male genitalia (Figs. 30 & 31; GP 2798/22 & 2799/22 SNB): Uncus with an acute hook bent to ventrad side, and a second, bulb-like structure on dorsal side. Transtilla central with slender, rounded lobe, and two lateral round projections with lots of bristles. The dorsal process of the valves with acute ventrad projection, the ventral one with one tip and dentate margin on ventrad side. Sacculus round, the juxta without major details, a ventrad semi-circle. Saccus short and round, vesica one round bulb with small dorsal and long distal hose-like projection.

Female (Figs 14a & b): The female differs from the male by a more olive ground colour, larger size, broader abdomen, more rounded wings, and different anatomy of the antennae. It has a forewing length of 57 – 60 mm, and the antennae are 15.0 mm long, completely bipectinate, there are 32 segments, the longest rami are 0.8 mm long. Pattern differences are the much larger forewing fenestrum with more drop-like form, with a maximum diameter of 4.0 – 5.9 mm. The 7 to 8 hyaline patches of the forewing postmedial are much wider, and the postmedial area is more greyish. The outer margin of the forewing is a little concave, the apex has a small apical tip bent outward. Also, the hindwing ocellus has a much bigger greenish hyaline, almost rhombic centre, the complete ocellus is little larger than in the male, with a maximum diameter of 10 – 11 mm. The black postmedial line is followed by a row of vertical hyaline patches, the marginal part again more greyish. On ventral side with same ornamentation and colours as the male.

Distinctive characters and discussion: See also the discussion below under *S. linzhica*, **n. sp.** which is a member of the same group. *S. dibanga*, **n. sp.** was known to the senior author from the type series, but exact locality data was missing until it was re-discovered by Peter Smetacek; perhaps most of the type series originated in the same locality. *S. dibanga*, **n. sp.** is the most greyish brown species in this group, compared to more orange colours of the other members. The forewing fenestrum is as small as in *S. belinda* Witt & Pugaev, 2007, but more drop-like and of different form. The very small hyaline portion of the hindwing ocellus is unique. Male genitalia structures differ from those of *S. belinda* in the form of the ventral process of the

uncus, the more triangular dorsal valve apex, and the more dentate ventral valve process; structures of this species were figured in the original description by Witt & Pugaev (2007).

***Salassa occinica*, n. sp.**

Holotype (Fig. 15a, dorsal view; Fig. 15b: ventral view): ♂, India (NE), Arunachal Pradesh, Mishmi Hills, VI.1990, leg. Wankhar. GP 2952/23 SNB; coll. CSNB. — A red holotype label will be added accordingly. The holotype will be deposited within the Rainer Seegers Foundation in the collections of MfN Berlin. The BOLD BIN Code is AEC2605.

Paratypes (in total 2 ♀♀): 1 ♀, India, Arunachal Pradesh, Mishmi Hills, V. 2007, coll. Loeffler; BC SNB 6369; coll. CSNB. 1 ♀, India, Arunachal Pradesh, road Roing – Hunli, 2400 m, 10.VII.2019, leg. P. Smetacek; female BC SNB 7297; coll. CBRC. – Blue paratype labels will be added.

Etymology: The name is a combination mentioning the westernmost distribution of a species group in the genus *Salassa* Moore, 1859, with the oldest available name being *S. katschinica* Bryk, 1944.

Description

Male (Figs. 15a & b): Length of forewing, measured from base to apex, 50 mm (holotype).

Head, thorax, abdomen and wings with orange-brown ground colour, wings with dark chestnut brown markings, the complete thorax and very basal part of the wings covered with hair-like scales. Antennae greyish brown, quadripectinate, 14.0 mm in length, with 35 segments, longest rami 1.8 mm.

Forewing a little rounded, apex almost right angled, slightly excised below apex, tornus rounded. Antemedial and medial area in ground colour, separated by an indistinct dark greyish antemedial line with white proximal shade. Forewing fenestrum with green transparent centre, drop-like, little rounded to proximal side, with upper and lower tip and short extension to marginal side, with a maximum diameter of 3.2 mm. Postmedial fuscous line curved, with faint white shade only near the lower wing margin, and without any hyaline patches between the veins. Postmedial area in the proximal half dark brown, ending violet in the apical area, marginal half in ground colour. Marginal fringe brown.

Hindwing with broad black antemedial and postmedial line, connected with a semicircle to each other near the upper wing margin and circling the eyespot with black pupilla and large transparent halfmoon-like vertical transparent zone, with broad white and outer vivid red ring, this with a maximum diameter of 12 mm. The eyespot surrounded by light greyish zone. The black postmedial line with three hyaline patches near the inner margin is followed marginally

with a white line and a greyish brown portion, suffused with orange scales, a dark bluish grey submarginal line, and the outer submarginal zone in ground colour. Marginal fringe brown.

On ventral side thorax, abdomen and legs covered with chestnut hair, legs dark violet brown. Both fore-and hindwings up to the postmedial line dark violet brown without any ornamentation, suffused with white hairs in the basal parts, only pattern are the transparent parts of the ocelli and fenestra with some black suffusion around. Postmedial line white, followed by an inner whitish violet part of the postmedial area in the proximal two thirds, separated with a dentate line from the marginal dark brown third.

Male genitalia (Fig. 32; GP 2952/23 SNB): Uncus with a hook bent to ventrad side, ending with a small bulb with apical tip, and a second, bulb-like structure on dorsal side. Transtilla central with slender, rounded lobe, and two small lateral broad-based, rounded projections covered with lots of bristles. The dorsal process of the valves of almost rectangular form with outer concave margin, the ventral one acute with very few dentate marginal projections. Sacculus round, the juxta without major details, a ventrad semi-circle. Saccus round and short, vesica one large round bulb with broad dorsal and long, slender distal hose-like projection.

Female (Figs 16a & b): The female differs from the male by its somewhat darker ground colour, the presence of hyaline patches in the postmedial line, the acute and prolongated forewing apical tip, larger size, broader abdomen, and different anatomy of the antennae. It has a forewing length of 58 mm, and the antennae are 15.0 mm long, completely bipectinate, there are 34 segments, the longest rami are 0.8 mm long. Pattern differences are the much larger, rhomboid forewing fenestrum, with a maximum diameter of 6.0 mm. There are 6 relatively large hyaline patches of the forewing postmedial line, and the postmedial area is more greyish. The outer margin of the forewing is more concave, the apex has an apical tip bent outward. Also, the hindwing ocellus has a much bigger greenish hyaline, almost halfmoon-like centre, the complete ocellus is larger than in the male, with a maximum diameter of 13 mm, but with same colouration. The black postmedial line is followed by a row of 5 vertical hyaline patches, the marginal part again more greyish. On ventral side with same ornamentation and colours as the male.

Distinctive characters and discussion: See also the discussion below under *S. linzhica,* **n. sp.** which is a member of the same group. *S. occinica,* **n. sp.** is a very colourful species which shares most characters with the smaller *S. linzhica,* **n. sp.** and the larger *S. katschinica* but differs from those species by its size, form of forewing fenestrum, hindwing ocellus, number of hyaline patches in the postmedial line, and details in male genitalia structures (form of the uncus tip and transtilla, outer margin of the dorsal valve apex, less dentate margin of the ventral valve process, and large size of the vesica).

***Salassa linzhica* n. sp.**

Holotype (Fig. 17a, dorsal view; Fig. 17b: ventral view): ♂, PR China, Tibet (Xizang Zizhiqu), Bomi County, Linzhi area, 2000 m, V.–VI.2021, leg. Local collector, material bought 2021 from Yang, Beijing; GP 2953/23 SNB; BC SNB 7257; coll. CSNB. — A red holotype label will be added accordingly. The holotype will be deposited within the Rainer Seegers Foundation in the collections of MfN Berlin. The BOLD BIN Code is AFA0475.

No paratypes.

Etymology: The name of this species is a combination of its type locality with a reminder to its probably nearest relative, *Salassa katschinica*.

Description

Male (Figs. 17a & b): Length of forewing, measured from base to apex, 46.5 mm (only holotype known).

Head, thorax, abdomen and wings with light orange-brown ground colour, wings with dark greyish brown markings, the complete thorax and very basal part of the wings covered with hair-like scales. Antennae greyish brown, quadripectinate, 13.0 mm in length, with 35 segments, longest rami 1.6 mm.

Forewing margin rounded, apex only slightly produced, tornus round. Antemedial and medial area in ground colour, separated by a faint dark greyish antemedial line with white proximal shade. Forewing fenestrum with green transparent centre, drop-like, rounded to proximal side, with costal tip and broad extension to marginal side, with a maximum diameter of 3.1 mm. Postmedial fuscous line curved, with slight white suffusion only near the lower wing margin and six very tiny hyaline patches between the upper veins. Postmedial area in the proximal half dark brown, ending violet in the apical area, marginal half in ground colour. Marginal fringe orange.

Hindwing with broad black antemedial and postmedial line, connected with a semicircle to each other near the upper wing margin and circling the eyespot with black pupilla and transparent halfmoon-like vertical transparent zone, with white and broad outer vivid orange-red ring, this with a maximum diameter of 8.0 mm. The eyespot surrounded by a small light greyish zone. The black postmedial line with six hyaline patches near the inner margin is followed marginally with a bluish violet portion, suffused with orange scales, a dark violet grey submarginal line widening towards the apex, and the outer submarginal zone in ground colour. Marginal fringe brown.

On ventral side, thorax, abdomen and legs covered with orange-brown hair, legs dark violet brown. Both fore-and hindwings up to the postmedial line orange brown without any ornamentation, suffused with white hairs in the basal parts, the only pattern are the transparent parts of the ocelli and fenestra surrounded with faint black shade. Postmedial line white,

followed by an inner orange and then whitish violet part of the postmedial area in the proximal two thirds, separated with a dentate line from the marginal olive brown third.

Male genitalia (Fig. 33; GP 2953/23 SNB): Uncus with a hook bent to ventrad side, ending with a rounded tip, and a second, bulb-like structure on dorsal side. Transtilla central with broad, rounded lobe, and two lateral slender, ear-like projections. The dorsal process of the valves of almost rectangular form, the ventral one with two dentate dorsal projections. Sacculus round, the juxta without major details, a ventrad semi-circle. Saccus a little triangular, vesica one round bulb with long distal hose-like projection.

Female: Unknown.

Distinctive characters and discussion: *S. linzhica*, **n. sp.** is the smallest of all species within the species-group around *S. katschinica* which all have quite rounded hindwing ocelli and a compact, rounded wing form separating them from most other taxa of the genus. Members of this group are *S. katschinica* itself, *S. belinda*, *S. dibanga*, **n. sp.**, *S. occinica*, **n. sp.**, and the here described *S. linzhica*, **n. sp.**. It differs from the members of that group by the smaller size. (Bryk (1944) in his description mentioned around 58 mm forewing length for his type series of *S. katschinica*, and two almost sympatrically collected specimens from Kachin State in the senior author's collection have a forewing length of 57 and 58 mm and thereby are much larger than all other members of the group), details of the pattern such as number of the hyaline patches near the postmedial line, form of the forewing fenestrum, intense orange colour, combination of colours on ventral side and details in male genitalia structures (the rounded tip of the uncus, form of transtilla, margins of valve processes, triangular form of saccus, and small size of vesica). Genitalia structures of the holotype of *S. katschinica* were figured already by Witt & Pugaev (2017) for comparison.

***Solus pseudodrepanoides*, n. sp.**

Holotype (Fig. 18a, dorsal view; Fig. 18b: ventral view): ♂, India, Arunachal Pradesh, Mishmi Hills, 2300 m, V.1990, leg. Wankhar; BC SNB 6472; coll. CSNB. — A red holotype label will be added accordingly. The holotype will be deposited within the Rainer Seegers Foundation in the collections of MfN Berlin. The BOLD BIN Code is AEC5132.

Paratypes (in total 4 ♂♂): 4 ♂♂, India (NE), Arunachal Pradesh, same data has holotype; GP 2954/23 SNB; BC SNB 6374 & 6375; coll. CSNB. – Blue paratype labels will be added.

Etymology: The species is named for its close relationship to the type species of the genus *Solus* Watson, 1914, *S. drepanoides* (Moore, 1865).

Description

Male (Figs. 18a & b): Length of forewing, measured from base to apex, 31 – 34 mm (holotype 31 mm).

Head, thorax, and forewings with intense light grey ground colour and typical pattern for the genus *Solus*. Collar and tegulae grey, central dorsal part of the thorax with orange patch. The antennae ochreous with a white base, quadripectinate, 7.0 mm in length, 22 segments in total, longest rami 1.0 mm long.

Forewing slender and elongate, apex strongly produced with almost right angled tornus, the outer margin a little concave. The area with hyaline patches large, with a large central patch. Postmedial line dark greyish carmine, almost straight in the lower part of the wing, bent backward towards the costa in the apical third. Postmedial area including apical zone grey, sometimes with orange hue, and a dark grey, dentate submarginal line, ending straight towards the apex.

Hindwing of greyish orange ground colour, with broad ante- and postmedial lines which never touch each other on the upper wing margin. Medial area with four to six hyaline patches. Postmedial area in the proximal half in ground colour, marginal half of which is separated by a thin grey and dentate line, more greyish, especially in the upper and lower parts. Tornal area suffused with grey.

On ventral side thorax and abdomen greyish. Antemedian lines on both fore- and hindwings absent, and postmedial lines dentate. Otherwise, similar to dorsal side.

Male genitalia (Fig. 34; GP 2954/23 SNB): Uncus bifurcate and V-shaped, with small dorsolateral angled projections. Transtilla serrate and a little triangular to ventral side. Dorsal process of the valves broad-based, with arched outer margin, ventral process strongly sclerotized, acute and almost straight. Juxta like a rounded sclerotized lobe, with small indention on ventral side. Saccus broad, straight, and long, aedeagus broad, with left ventrolateral sclerotization at its end, vesica with a bent row of cornuti.

Female: Unknown.

Distinctive characters and discussion: *Solus pseudodrepanoides*, **n. sp.** forms with *S. drepanoides* and *S. medogiana* Brechlin, 2015 a small group in the genus with very colourful species with huge hyaline patches on the forewing. *S. drepanoides* which is known to us from Darjeeling (type locality), Nepal, Sikkim, and western Bhutan is slightly smaller, has a small bulge on the outer hindwing margin, and an ochreous postmedial and apical area of the forewing. *S. medogiana* (with its younger synonym *S. wui* Lang, 2017; already synonymized by Brechlin, 2022), known from Tibet and northern Arunachal Pradesh, has almost the same size as *S. pseudodrepanoides*, **n. sp.**, but is much more colourful, with carmine forewing postmedial line and ochreous yellow postmedial area; the marginal half of the hindwing postmedial area is almost entirely greyish violet, and in almost all specimens the hindwing ante- and postmedial

lines are connected to each other in the upper wing area. Male genitalia structures are quite similar to those of *S. drepanoides*, but differ in details of the lateral uncus and the triangular transtilla; the valves of *S. drepanoides* have a more right-angled dorsal margin of the dorsal process, and the ventral process is less sclerotized and more acute. The juxta of *S. drepanoides* lacks the ventral indention, and the saccus is smaller. *S. medogiana* bears a U-shaped uncus with different transtilla, the dorsal process of the valves is rounded, the ventral process is longer. Details of all genitalia structures of *S. drepanoides* and *S. medogiana* (there under the name *S. wui*) were nicely figured by Lang (2017) for comparison. *S. drepanoides* has the BOLD BIN Code AAD7316, and *S. medogiana* ABZ0707.

In the original description of the genus more than hundred years ago, Watson (1914) already mentioned the unique wing venation of the single known specimen he examined (a male specimen of *S. drepanoides* from Bhutan) and the unique appearance with the irregular hyaline patches which reminded him of the African genus *Eudaemonia* Maassen, 1877 (probably *E. argiphontes* (Westwood, 1849)). He found some concordance of the venation with Attacini which are not really closely related to *Solus*. The standing of the genus is somewhat ambiguous and might even demand classification in an own, separated subfamily of Saturniidae. Preimaginal instars of the whole genus are still unknown to science, and knowledge of those would help a lot to classify *Solus* properly within Saturniidae.

***Solus tawanga*, n. sp.**

Holotype (Fig. 19a, dorsal view; Fig. 19b: ventral view): ♂, India (NE), Arunachal Pradesh, Ziro, Pange valley, 1850 m, 15.VI.2007, 4.00h, leg. G.-Bretschneider, coll. CSLL; BC SNB 6319; coll. CSNB. — A red holotype label will be added accordingly. The holotype will be deposited within the Rainer Seegers Foundation in the collections of MfN Berlin. The BOLD BIN Code is ABZ2058.

Paratypes (in total 10 ♂♂): 8 ♂♂, same locality as holotype, but 15.VI.2007, 0.15h, 0.45h, & 4.00h, 16.VI.2007, 3.30h, 17.VI.2007, 3.45h, 18.VI.2007, 2.00h & 2x 3.00h; GP 2956/23 SNB; BC SNB 6320; coll. CSLL. 2 ♂♂, India (NE), Arunachal Pradesh, Dist. Bomdila, near hill station, N27.28355' E92.41671', 2800 m, 21.–23.VII.2007, leg. Gil Bretschneider, coll. CSLL; GP 2075/09; BC SNB 1360 & 3800; material exchanged with S. Löffler IX.2007; coll. CSNB. – Blue paratype labels will be added.

Etymology: The name of the new species refers to Tawang, the westernmost known locality for the moth.

Description

Male (Figs. 19a & b): Length of forewing, measured from base to apex, 33 – 34 mm (holotype 34 mm).

Head, thorax, and forewings with faded greyish ground colour and typical pattern for the genus *Solus*. Collar and tegulae light grey, central dorsal part of the thorax with some ochreous hairs. The antennae ochreous with a white base, quadripectinate, 7.5 mm in length, 21 segments in total, longest rami 1.2 mm long.

Forewing slender and elongate, apex strongly produced with very acute tip, with rectangular tornus, the outer margin almost straight. The area with hyaline patches relatively small compared to other species, with a large costal patch and several very small ones in the upper half of the wing. Postmedial line greyish carmine, almost straight in the lower part of the wing, bent backward as a very thin line towards the costa in the apical area. Postmedial area including apical zone light ochreous, sometimes with greyish hue, and a grey, dentate submarginal line, ending straight towards the costal area in front of the apex.

Hindwing of ochreous ground colour, with broad ante- and postmedial lines which touch each other on the upper wing margin. Medial area with four to five hyaline patches, some of them partly only indicated as dark grey patches. Postmedial area in ground colour, with a tiny grey and dentate line, more greyish lower parts. Greyish brown suffusion around the apex and tornus.

On ventral side thorax, abdomen and most parts of the legs in ground colour, first pair of legs with white tarsi and black claw. Antemedian lines on both fore- and hindwings absent, and postmedial lines dentate. Otherwise, similar to dorsal side.

Male genitalia (Fig. 35 & 36; GP 2075/09 & 2956/23): Uncus bifurcate, with two projections directed to ventrad side on each process. Central part of the transtilla very long and almost rectangular. Dorsal process of the valves relatively slender, with strongly serrate dorsal margin; ventral process long and straight. Juxta with two dorsolateral tips, saccus short. Vesica with two separated fields of sclerite rows.

Female: Unknown.

Distinctive characters and discussion: *Solus tawanga*, **n. sp.** is a member of the complex around *S. parvifenestratus* Bryk, 1944, with probably its nearest relative *S. loba* Lang, 2017, **stat. nov.** as species, described from Tibet, but known to us also from higher altitudes in northeastern Arunachal Pradesh (specimens in coll. Smetacek), near to the Tibetan type locality. *S. loba* is of more homogenous ochreous ground colour, and specimens available to us from Arunachal Pradesh with similar barcode result as the holotype of *S. loba* are larger, and have the forewing apex much more produced and more acute than *S. tawanga*, **n. sp**. Male genitalia structures resemble those of *S. parvifenestratus* (from eastern Myanmar) but differ a little in the shape of the uncus processes, the even more serrate dorsal valve process, and details of the vesica sclerites. Genitalia of the almost sympatric *S. loba* differ even more, with shorter transtilla, not serrate, rounded and more slender dorsal valve processes and the broad-based ventral valve processes. Details of the genitalia of *S. loba* were figured nicely by Lang (2017). *S. loba* has a

flight time later in the year, starting in August in Tibet, as late as November in Arunachal Pradesh. *S. loba* has the BOLD BIN Code ACK9522.

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Figure 1a (left): *Actias smetaceki* **sp. n.** Holotype male dorsal; 1b (right): *ditto* ventral

Figure 2a (left): *Actias smetaceki* **sp. n.** Paratype female dorsal; 2b (right): *ditto* ventral

Figure 3a (above): *Actias loeffleri* **sp. n.** Holotype male dorsal; 3b (below): *ditto* ventral

Figure 4a (left): *Loepa melichari* **sp. n.** Holotype male dorsal; 4b (right) *ditto* ventral

Figure 5a (left): *Loepa melichari* **sp. n.** Paratype female dorsal; 5b (right) *ditto* ventral

Figure 6a (above): *Loepa himalayana* **sp. n.** Holotype male dorsal; 6b (below) *ditto* ventral

Figure7a (left): *Loepa himalayana* **sp. n.** Paratype female dorsal; 7b (right): *ditto* (ventral)

Figure 8a (left): *Loepa himalayana* **sp. n.** Paratype male dorsal (Tibet); 8b (right): *ditto* ventral

Figure 9a (left): *Cricula mishmica* **sp. n.** Holotype male dorsal; 9b (right): *ditto* ventral

Figure 10a (left): *Cricula mishmica* **sp. n.** Paratype male dorsal; 10b (right): *ditto* ventral

Figure 11a (left): *Sinobirma occidentalis* **sp. n.** Holotype male dorsal; 11b (right): *ditto* ventral

Figure 12a (left): *Sinobirma occidentalis* **sp. n.** Paratype female dorsal; 12b (right): ditto ventral

Fig. 13a (left): *Salassa dibanga* **sp. n.** Holotype male dorsal; 13b (right): *ditto* ventral

Figure 14a (left): *Salassa dibanga* **sp. n.** Paratype female dorsal; 14b (right) *ditto* ventral

Figure 15a (left): *Salassa occinica* **sp. n.** Holotype male dorsal; 15b (right): *ditto* ventral

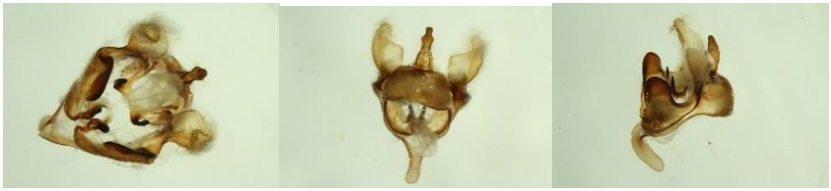
Figure 16a (left): *Salassa occinica* **sp. n.** Paratype female dorsal; 16b (right): ditto ventral

Figure 17a (above): *Salassa linzhica* **sp. n.** Holotype male dorsal; 17b (below): *ditto* ventral

Figure 18a (left): *Solus pseudodrepanoides* **sp. n.** Holotype male dorsal; 18b (right): *ditto* ventral

Figure 19a (left): *Solus tawanga* **sp. n.** Holotype male dorsal; 19b (right): *ditto* ventral

GENITALIA



20a. ventral 20b. dorsal 20c. lateral

20d. aedeagus 20e. detail of aedeagus

Figs. 20 a,b,c,d,e: *Actias smetaceki* **sp. n.** Paratype 2599-19 SNB

Fig. 21. Paratype 0944-03 SNB

Fig. 22. Paratype 1388-06 SNB

Figs. 21 & 22: *Actias loeffleri* **sp. n.** aedeagus & male genitalia capsule

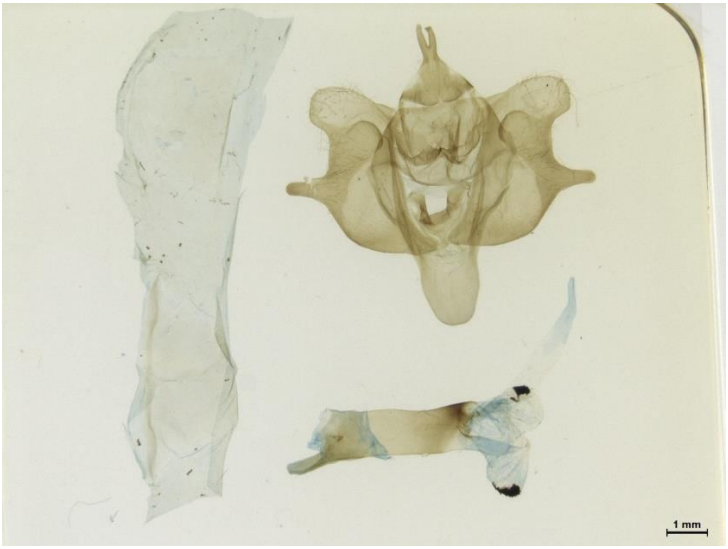


Fig. 23. *Loepa melichari* **sp. n**. Paratype 2847-22 SNB

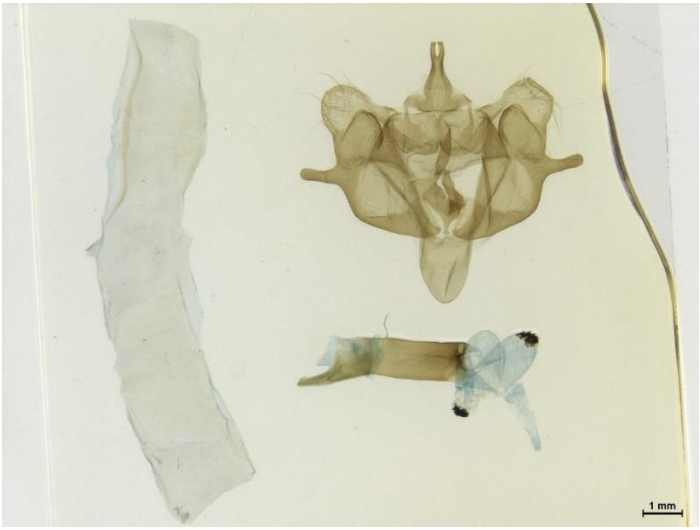


Fig. 24. *Loepa anthera* Vietnam 2848-22 SNB

Fig. 25. *Loepa himalayana* **sp. n.** Paratype Arunachal Pradesh 2733-21 SNB

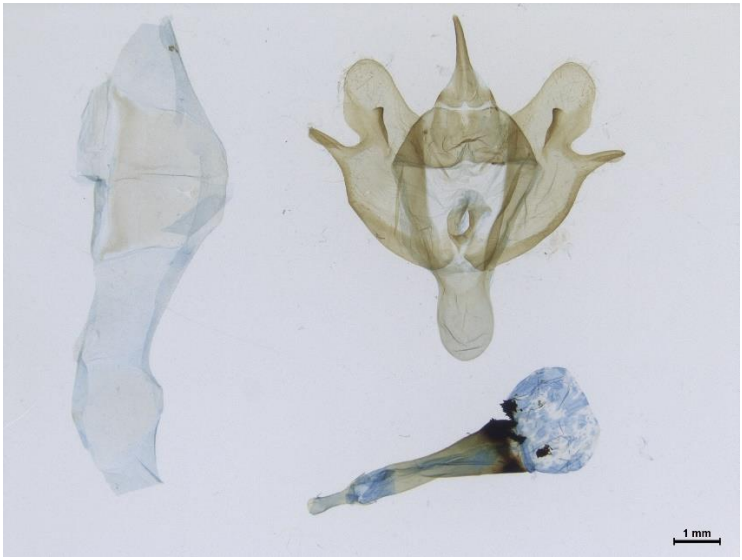


Fig. 26. *Loepa himalayana* **sp. n.** Paratype Tibet 2732-21 SNB

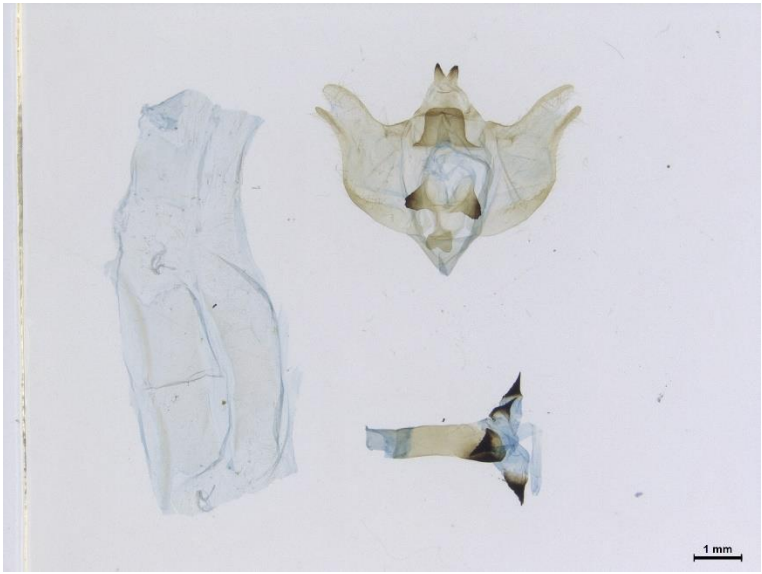


Fig. 27. *Cricula mishmica* **sp. n.** Holotype 2718-21 SNB

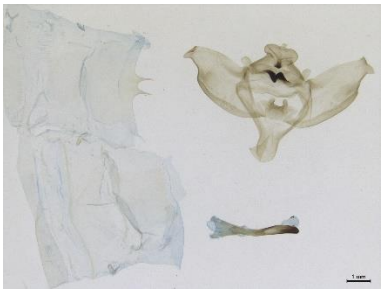


Fig. 28. Holotype 2624-19 SNB

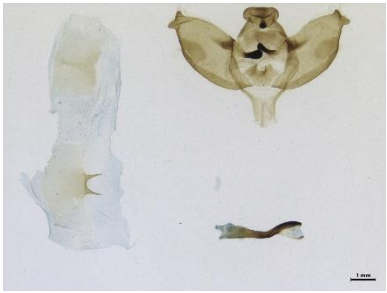


Fig. 29. Paratype 2912-23 SNB

Figs. 28 & 29. *Sinobirma occidentalis* **sp. n.**

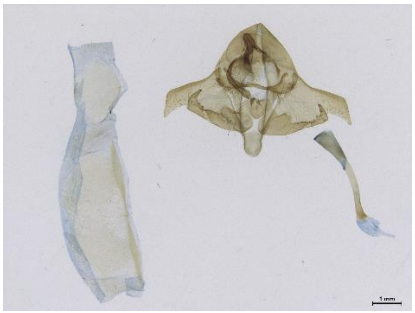


Fig. 30. Holotype 2798-22 SNB

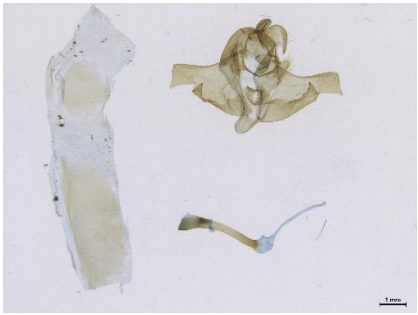


Fig. 31. Paratype 2799-22 SNB

Figs. 30 & 31. *Salassa dibanga* **sp. n.** male genitalia

Fig. 32a. genitalia capsule

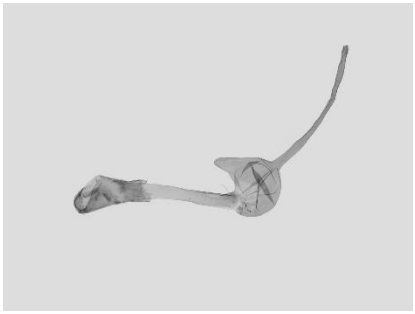


Fig. 32b. aedeagus

Fig. 32a & b: *Salassa occinica* **sp. n.** Paratype 2952-23 SNB

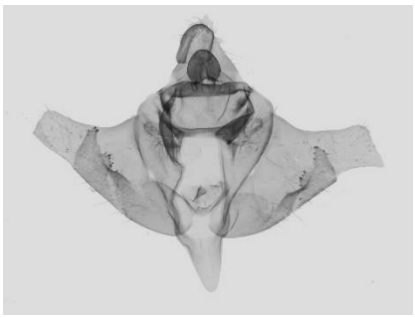


Fig. 33a. genitalia capsule

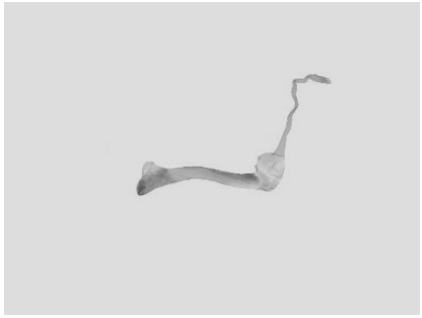


Fig. 32b. aedeagus

Fig. 33a. *Salassa linzhica* **sp. n.** Holotype 2953-23 SNB

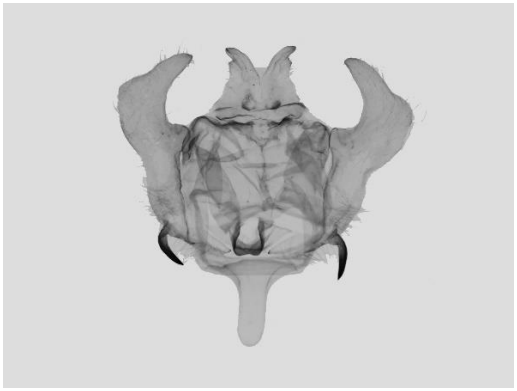


Fig. 34a. genitalia capsule

Fig. 34b. aedeagus

Fig. 34a & b. *Solus pseudodrepanoides* **sp. n.** Paratype 2954-23 SNB

Fig. 35**.** Paratype 2075-09 SNB

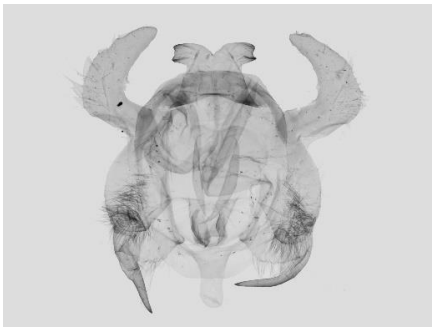


Fig. 36a. Paratype 2956-23 SNB

Fig. 36b. aedeagus

Figs. 35, 36a & 36b. *Solus tawanga* **sp. n.**