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Cover Photo: Larva of Zebra Skipper *Ernsta zebra* (Hesperiidae) from Rajasthan.
Photo Credit: Mukesh Panwar

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CONFIRMATION OF *DEROCA HIDDA* (LEPIDOPTERA: DREPANIDAE) IN BHUTAN

SONAM LHAKI DEMA

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: *Reviewer: Peter Smetacek*

Deroca Walker, 1855 is a small genus of Drepanid moths comprising 4 species, remarkable for their semi- or fully transparent wings. On the Indian subcontinent, 3 species are found in the Himalaya. *D. hyalina* Walker, 1855 known from the N.W. Himalayas; Sikkim; Nagas; Manipur (India); E. Pegu (Myanmar)(Hampson, 1892) China (Watson, 1968); *D. inconclusa* (Walker, 1856) known from the N.W. Himalayas; Nagas; Manipur (Hampson, 1892), Myanmar, China (Watson, 1968), and *D. hidda* Swinhoe, 1900 (type locality: Meghalaya) from Sikkim, N. India, Myanmar and China (Watson, 1968). So far, only *D. hyalina* has been reported from Bhutan (Giels, Franssen & Wangdi, 2022)

On 5 September 2023, a specimen of *Deroca* Walker, 1855 was discovered perched on a leaf of a tree, *Benthamidia capitata* at Bumthang, Bhutan and photographed. It was identified as *D. hidda* (Figure 1). Further study clarified that this species had not been previously reported from Bhutan. It is interesting that Smetacek & Smetacek (2011) report *B. capitata* as a larval hostplant for both *D. hyalina* as well as *D. inconclusa* in the western Himalaya. It is not unlikely that this tree is also a hostplant for *D. hidda*.

Figure 1: *Deroca hidda*

Therefore, the present report confirms the presence of *D. hidda* in Bumthang, Bhutan, (Elevation: 2572m) (27.555199°N; 90.744386°E).

This increases the number of *Deroca* species known from Bhutan to 2 of the 4 species in the genus. It is almost certain that the remaining Himalayan species, *D. inconclusa* will also be found in Bhutan, since it occurs both to the east and west. The fourth species in the genus is not known from the Indian subcontinent and is found in China.

ACKNOWLEDGEMENT

I am grateful to Peter Smetacek, Butterfly Research Centre, Bhimtal, Uttarakhand, India for constant encouragement and help rendered in determining *D. hidda*. I also would like to thank Mr. Pema Wangda, Chief Forestry Officer, Thimphu Forest Division, Mr. Ugyen Dorji, Senior Forest Ranger, Thimphu Forest Division, Mr. Lhaba, Senior Forest Officer, Thimphu Forest Division and Mr. Karma Wangdi, Forest Ranger, Ugyen Wangchuk Institute for Forestry Research and Training for their support.

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THREE NEW ADDITIONS TO THE LEPIDOPTERAN FAUNA OF BARNAWAPARA WILDLIFE SANCTUARY, BALODA BAZAR DISTRICT, CHHATTISGARH, INDIA.

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Reviewer: A. S. Sisodia

ABSTRACT

Recent butterfly studies in Chhattisgarh have focused on several districts and conservation areas, but not a lot towards Barnawapara Wildlife Sanctuary. The present study confirms new distribution records of three butterfly species: Indian Oakblue (*Arhopala atrax*), Pioneer (*Belenois aurota*), and Restricted Demon (*Notocrypta curvifascia*) from Barnawapara Wildlife Sanctuary. This study contributes to the existing knowledge of butterfly diversity and species composition in Barnawapara Wildlife Sanctuary, shedding light on their occurrence in BWLS.

KEYWORDS: Pioneer, Butterfly, New record, Lepidoptera, Chhattisgarh.

INTRODUCTION

Barnawapara Wildlife Sanctuary (BWLS) (21° 81' N and 21° 00' N to 82° 22'E and 82° 37'E) in district Baloda Bazar, Chhattisgarh, encompasses an expanse of 244 km². It boasts nine sub-circles and forty-five beats, rendering it a destination for wildlife enthusiasts. The sanctuary derives its name from the amalgamation of two villages, Bar and Nawapara, which hold a central position within its boundaries. Its summer temperatures range between 40°C and 47°C, while the winter season experiences a gradual descent to 5°C to 7°C. Annual rainfall is approximately 1100mm to 1300mm.

There are numerous small and large waterbodies that cater to the flourishing wildlife. Type 5 A/C 1b (iii) Dry Teak, Type 5 B/C 1c (iv) Dry Peninsular Sal Forest, Type 5 B/C 2 (xi) Northern Dry Mix Deciduous Forest, Type 5 E/9 Dry Bamboo Forest forms the forest composition of BWLS (Champion & Seth, 1968). The flora includes species *viz.*, *Shorea robusta* L., *Tectona grandis* L. *f.*, *Terminalia arjuna* Roxb. ex D.C.,

Terminalia chebula Retz., *Terminalia tomentosa* Wt. & Arn., *Cleistanthus collinus* Benth ex Hook. *f.*, *Mangifera indica* L., *Pithocellebium dulce* Roxb. (Benth.), *Ficus religiosa* L., *Ficus benghalensis* L., etc., while the fauna includes Sloth Bear (*Melursus ursinus*), Golden Jackal (*Canis aureus*), Four-horned Antelope (*Tetracerus quadricornis*), Leopard (*Panthera pardus*), Black Buck (*Antilope cervicapra*), Jungle Cat (*Felis chaus*), Rhesus Macaque (*Macaca mulatta*), Indian Bison (*Bos gaurus*), Wild Boar (*Sus scrofa*), etc.

Recent studies on butterflies from several districts and conservation areas in Chhattisgarh have been conducted by a number of workers (Singh & Chandra, 2002; Chandra *et al*., 2007; Chandra *et al*., 2014; Sisodia, 2019; Nihlani *et al*., 2021; Tandan *et al*., 2021; Chand *et al*., 2022). Previous study at Barnawapara Wildlife Sanctuary by Kudarya & Bhandarkar (2021) reported 33 butterfly species. This count was later updated and reported for 127 species of butterflies in the form of a field guide by Nihlani *et al*. (2022). The present study aims to update the butterfly count of BWLS. This study contributes to the existing knowledge of butterfly diversity in BWLS.

MATERIAL AND METHODS

Opportunistic butterfly surveys were conducted intermittently from January 2023 to April 2023, at and around Barnawapara Wildlife Sanctuary (Figure 1) to document and assess the overall butterfly diversity of the sanctuary. The visual observations were taken into account to identify and record butterfly species encountered during the survey. Documentation was primarily through photographs, using a DSLR camera and handheld mobile device, to document the appearance, wing patterns, and distinguishing features of the observed butterflies.

These photographs served as reference material for species identification and documentation. Species identification was based on field guides, standard literatures, and expert consultations were used to identify the butterflies (Varshney & Smetacek, 2015; Kunte, 2000; Antram, 2002, Kunte *et al*., https://www.ifoundbutterflies.org).

RESULT AND DISCUSSION

Notably, this communication confirms the new distribution records of three butterfly species from BWLS (Table 1). Indian Oakblue (*Arhopala atrax*, Hewitson, 1862) (Family: Lycaenidae) was spotted on 3.i.2023 on a semi wet ground, near a dry stream (Figure 2); Pioneer (*Belenois aurota*, Fabricius, 1793) (Family: Pieridae) was spotted on 12.iii.2023 on a flower of *Tridax procumbens* L. plant, it was involved in nectaring (Figure 3); Restricted Demon (*Notocrypta curvifascia* C. & R. Felder, 1862) (Family: Hesperiidae) was spotted on 20.ii.2023 settled on a dry leaf on the ground within the sanctuary (Figure 4).

These three species were recorded by direct sightings in the field, during the survey period and have never been reported earlier by any worker in BWLS.

The new distribution records of the Indian Oakblue, Pioneer, and Restricted Demon butterflies augment the known butterfly diversity of BWLS.

ACKNOWLEDGEMENTS

We extend our gratitude and thanks especially to Mr. Mayank Agarwal, Div. Forest Officer, Balodabazar, Range Officers, BWLS and frontline field staff of the State Forest Department, who facilitated and supported us during the survey.

Figure 2: Indian Oakblue (*Arhopala atrax*, Hewitson, 1862)

Figure 3: Pioneer (*Belenois aurota* Fabricius, 1793)

Figure 4: Restricted Demon (*Notocrypta curvifascia*, C. & R. Felder, 1862)

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OBSERVATIONS ON THE LIFE CYCLE OF *LYMANTRIA DETERSA* WALKER, 1865 (LEPIDOPTERA: EREBIDAE) AND RECORD OF *TERMINALIA BELLIRICA* AS ITS NEW LARVAL HOST PLANT

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Reviewer : Peter Smetacek

INTRODUCTION

The study area is called 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 one quarter of an acre.

The authors studied the lepidoptera and plant interactions in the BNHS Nature Reserve during a period of six months (September 2022 to February 2023). Field observation as well as rearing of larvae was done to know the larval host plants of butterflies and moths.

This paper describes findings about the Detersa Tussock Moth *Lymantria detersa* Walker, 1865 (Lepidoptera: Erebidae). It is found in Southern India (Ahmednagar, Bombay, Belgaum, Nagrishpur, Poona, S. Coorg) (Gupta 1992).

MATERIALS AND METHOD

Eggs or larvae of lepidopterans were collected by authors for rearing. Those were reared and data maintained. The larvae were fed with the staple diet of leaves of the plant on which the larvae were found. The rearing jars were cleaned of the frass every day. The jars were loosely closed to allow aeration but to prevent parasitoids or ants from entering it. A tissue paper was kept inside the jar to absorb the excess moisture from frass of the larvae. Observations about the life cycle in wild were also noted.

OBSERVATIONS

The authors found a group of well camouflaged larvae huddled together on the bark of Baheda tree (*Terminalia bellirica*) trunk inside the Conservation Education Centre (CEC) building in BNHS Nature Reserve, Mumbai. The

larvae were of two sizes, smaller and larger in the same group. They had a unique feeding pattern. When they were small, they were seen feeding on only one side of the leaf and then they would turn to other side just leaving the midvein and secondary venations. The larvae were seen feeding during the night and were never seen feeding during the day time. A similar observation was reported from Coimbatore, India (Pillai *et al.* 1999). Pillai *et al*. (1999) reported that larvae feed at night and hide during the day in loosely spun silken mats to which cut tree needles are appressed to provide further protection.

Many larvae were collected and kept in rearing jars – one in each jar. The larvae were fed with the staple diet of the Baheda *T. bellirica* leaves. The rearing jars were cleaned of the frass every day. Later, the larvae pupated by making cocoons of loose silk threads and pupated inside the rearing jar. The pupae also showed sexual dimorphism, and were also of two sizes. The smaller pupa hatched after 10 days of pupal diapause and a brown moth eclosed. The moth was released after photographing. It had comb-like bipectinate antennae. We identified the moth as a male Detersa Tussock Moth *Lymantria detersa* Walker, 1865 (Lepidoptera: Erebidae) from following features: brown bipectinate antennae, thorax brown, legs cream coloured, forewing brown; basal area black with spot on anal vein, subterminal band brown consisting of wide crescent-shaped spots between veins from costa to posterior margin; fringe light brown with black spots between veins; hindwing colour being dirty white (Pogue & Schaefer, 2007; Vaylure, 2018).

After a few days, a nearly wingless creature (brachypterous) with bulging abdomen eclosed from the bigger-sized pupa at around 11am. It did not move a bit, possibly due to its heavy abdomen and remained at the same place. It was photographed and identified as Tussock moth (*Lymantria* spp.) which showed the similarity with *Lymantria* sp. found in Sri Lanka. Later we realized that the creature was a mouthless, nearly wingless female of the Detersa Tussock Moth *Lymantria detersa*.. The male and female adults were sexually dimorphic, the female having highly atrophied wings (Strand, 1923) (as good as wingless) and hence were flightless. The female even lacked the feeding parts or the mouth. The female's abdomen looked like a bulging bag full of eggs.

The flightless female was released on the trunk bark of a *T. bellirica* tree. The female released a white liquid (presumably pheromones); after a few minutes, a male arrived and located her. The male flew after mating with the female in the mid-afternoon. The female was seen laying many eggs on the same day and covering those with a dense mat of fine golden hair for the next few days, after which she fell and died (see images). Thus, the female did not even move from the place where the larva had pupated.

The batch of eggs hatched after few days and tiny larvae emerged. Due to their cryptic colouration and habit of huddling together, it was difficult to locate them on the tree trunk. Throughout the day the

group of larvae remained motionless and huddled together forming a shape which resembled the tree bark!

Length of female pupa was bigger and measured 3.3 cm—3.8 cm (average 3.6 cm, n=3). The length of male pupa was 1.4 cm —1.75cm (average 1.55 cm, n=14). The pupal diapause was found to be different for the two sexes. The adult males eclosed from pupae after 8 —12 days (average 10.11 days, n=9), whereas the females eclosed after 6 days (n=1). The pupa had tufts of hair loosely spread all over the surface.

In another set of observations four female pupae were collected from the concrete walls of the building, out of which only two adult females eclosed and laid eggs. The third was found dead after eclosion and release. The fourth died by infestation with parasitoids. Hence, the pupal diapause for these individuals was not considered.

In the wild, the larvae were seen hanging with silk threads from the *T. bellirica* tree in early mornings, suggesting they climbed up to feed on leaves in the night. It was seen on many occasions that both male and female larvae had pupated on the concrete walls of the building inside a loose mesh of silk threads.

DISCUSSION

The two reported larval host plants for *Lymantria detersa* are: *Acacia nilotica* (L.) Willd. ex Delile, (Fabaceae) (Strand, 1923); *Casuarina equisetifolia* L. (Casuarinanceae) (Pillai *et al.* 1999; Robinson *et al.* 2010). *Terminalia bellirica* (Family Combretaceae) has not been reported as a larval host plant for *Lymantria detersa*.

Also, it was speculated that, as with other flightless moth females (e.g., North American Gypsy Moth *Lymantria dispar dispar* (Linnaeus, 1758) and species in the related genus *Orgyia* Ochsenheimer, 1810), fecundity is largely influenced by flightlessness (Pogue & Schaefer, 2007). The *L. detersa* females looked like swollen bags full of eggs. In a literature search, photographic records of the brachypterous or flightless females of *L. detersa* could not be found and thus these could be possibly the first photographic records of the species females.

CONCLUSION

The regular observations of many larvae feeding on the leaves of *Terminalia bellirica* in the wild, as well as rearing on the staple diet of these leaves up to eclosion of adult moths proves its regular use as a larval host plant. The paper also presents possibly the photographic records of the brachypterous females of *L. detersa*.

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Thanks to Mr. Dilip Giri, Field Assistant at BNHS Conservation Education Centre (CEC Mumbai), for his help in rearing the larvae. Thanks to other staff, *viz.*, Ms. Kiran Thumma, Mr. Prakash Ghadashi and Mr. Vinayak Giri for their help during the research work.

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Fig 1: Cocoon showing eggs ©*Priya Gupta*

Fig 2: First instar © *Priya Gupta*

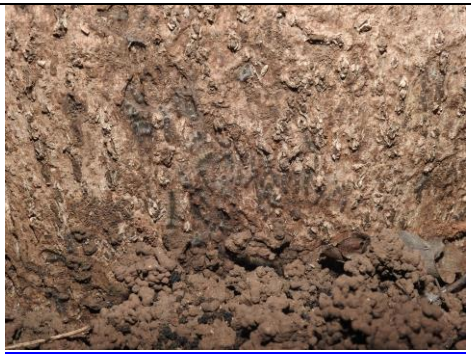

Fig 3: Larvae in tree trunk © Raju Kasambe

Fig 4: Larvae in tree trunk © Raju Kasambe

Fig 5: Female pupa with loose silk cocoon © Raju Kasambe

Fig 6: Freshly eclosed female laying egg and covering with hair © Raju Kasambe

Fig 7: Male pupa © Priya Gupta

Fig 8: Freshly eclosed male © Priya Gupta

Fig 9: Mating showing sexual dimorphism © Priya Gupta

Fig 10: Mating showing sexual dimorphism © Priya Gupta

Fig 11: Female larvae and parasitoids © Raju Kasambe

AN INVENTORY OF BUTTERFLIES FROM CHILKIGARH, WEST BENGAL

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Keywords: Biodiversity Heritage Site, Butterfly, Chilkigarh, Jhargram, Kanak Durga Sacred Grove, Lepidoptera.

Chilkigarh (22˚15'-22˚0' N; 86˚45'-87˚0' E) is a village under Jamboni block in the Jhargram district of West Bengal, India. Located at the east catchment zone of the Dulung river at an elevation of 60-85 m above mean sea level, the area is predominantly characterized by reddish-brown silty-clay loamy soil and tropical moist deciduous forest (Kamilya & Paria, 1994; Saadi *et al*., 2020). The area presently is gaining prominence due to the biological and historical importance of the Chilkigarh Sacred Grove, a relict forest patch consisting of deciduous, semi-deciduous and evergreen species in its near-climax stage, harbouring the renowned Kanak Durga temple (Bhakat, 2009; Kar *et al.*, 2015).

A rapid survey was carried out for the butterfly fauna during 25-28 February, 2017 in the village area, including the forest patches, gardens, roadside habitats, the river bed and the sacred grove for two days, covering the entire diurnal span to record both crepuscular and day-flying species. The identification of the adult species was done *in-situ* and from photographs following Evans (1927), Wynter Blyth (1957), Kehimkar (2016) and Kunte *et. al*. (2023). Classification was according to van Nieukerken *et al*. (2011).

A total of 47 species of butterflies under 35 genera and five families were documented for the first time from this region (Table 1), with the family Nymphalidae being most species-rich (46.8%), followed by Papilionidae and Lycaenidae (14.9% each), Pieridae (12.8%) and Hesperiidae (10.6%). The taxonomic distribution for the five butterfly families is shown in Table 2, which clearly illustrates Nymphalids to be the most taxonomically diverse family (with 22 species under 14 genera and eight subfamilies). Each genus under Hesperiidae, Pieridae and Lycaenidae was represented by a single species. The genus *Junonia* Hübner was unique being represented by all the six species that are available in the country (Table 1).

Apart from the 12 rarely observed species (marked with * in Table 1) during the study period, the remaining butterflies were fairly common throughout the area, especially concentrated in and around the maintained gardens. Only six species, namely *N. paralysos, U. folus, J. celeno, E. klugii, D. sondaica* and *M. leda* were recorded in the sacred grove. A single individual of *D. sondaica* was found to settle on the thick litter in the sacred forest, with bamboo thickets nearby. *P. clytia*, *N. paralysos* and *Z. karsandra* were found nectaring from the flowers of *Hibiscus rosa-sinensis*, *Clerodendrum viscosum* and *Vernonia cinerea* respectively, while *Tridax procumbens* served as the most available source of nectar for *C. nerissa, S. vulcanus, L. plinius* and *C. pandava*. Two rare nymphalids, *C. psaphon* and *M. procris* were recorded while puddling on the Dulung river bed.

Extensive studies exploring the floral diversity of this area were carried out by Kamilya & Paria (1994) and Saadi *et al*. (2020). However, faunistic studies, especially of invertebrates, are few, as compared to their vertebrate counterparts, which have been studied mostly within and very rarely outside the grove (Bhakat, 2009; Das *et. al*. 2014). The present study on butterfly fauna adds to the known invertebrate faunal diversity existing in the area. The diverse habitats of Chilkigarh, including the Chilkigarh Kanak Durga Sacred Grove – a protected and recently declared Biodiversity Heritage Site (Anon, 2018) serves as a unique faunal repository. Increase in human-induced habitat modification and fragmentation, both inside the sacred grove as well as areas surrounding the grove is a potential threat towards the integrity of the ecosystem.

Table 1. A list of the butterfly fauna (Lepidoptera: Papilionoidea) of Chilkigarh, West Bengal. (* indicates rarity of species)

Order Lepidoptera
Family Papilionidae
Subfamily Papilioninae
Graphium agamemnon (Linnaeus, 1758)
Papilio clytia Linnaeus, 1758

Papilio polytes Linnaeus, 1758

Papilio polymnestor Cramer, 1775

Papilio demoleus Linnaeus, 1758

Papilio crino Fabricius, 1793

Pachliopta aristolochiae (Fabricius, 1775)

Family Hesperiidae

Subfamily Pyrginae

Celaenorrhinus leucocera (Kollar, 1848) *

Subfamily Hesperiinae

Iambrix salsala (Moore, 1865)

Notocrypta paralysos (Wood-Mason & de Nicéville, 1881) *

Udaspes folus (Cramer, 1775) *

Telicota sp. *

Family Pieridae

Subfamily Coliadinae

Eurema hecabe (Linnaeus, 1758)

Catopsilia pyranthe (Linnaeus, 1758)

Subfamily Pierinae

Pareronia anais (Lesson, 1837)

Appias libythea (Fabricius, 1775)

Cepora nerissa (Fabricius, 1775)

Leptosia nina (Fabricius, 1793)

Family Lycaenidae

Subfamily Theclinae

Spindasis vulcanus (Fabricius, 1775)

Subfamily Polyommatinae

Castalius rosimon (Fabricius, 1775)

Leptotes plinius (Fabricius, 1793)

Jamides celeno (Cramer, 1775) *

Zizeeria karsandra (Moore, 1865)

Chilades pandava (Horsfield, 1829)

Chilades lajus (Stoll, 1780)

Family Nymphalidae

Subfamily Danainae

Tirumala limniace (Cramer, 1775)

Danaus genutia (Cramer, 1779)

Danaus chrysippus (Linnaeus, 1758)

Euploea klugii Moore, 1858 *

Euploea core (Cramer, 1780)

Subfamily Charaxinae

Charaxes psaphon Westwood, 1847 *

Subfamily Morphinae

Discophora sondaica Boisduval, 1836

Subfamily Satyrinae

Melanitis leda (Linnaeus, 1758)

Elymnias hypermnestra (Linnaeus, 1763)

Mycalesis sp.

Subfamily Limenitidinae

Neptis hylas (Linnaeus, 1758) *

Neptis jumbah Moore, [1858] *

Moduza procris (Cramer, [1777])

Subfamily Heliconinae

Acraea violae Fabricius, 1775

Subfamily Biblidinae

Ariadne merione (Cramer, 1779)

Subfamily Nymphalinae

Junonia orithya (Linnaeus, 1758) *

Junonia hierta (Fabricius, 1798) *

Junonia iphita (Cramer, 1782)

Junonia atlites (Linnaeus, 1763)

Junonia almana (Linnaeus, 1758)

Junonia lemonias (Linnaeus, 1758)

Hypolimnas bolina (Linnaeus, 1758)

Table 2. An overview of the taxonomic diversity of butterfly fauna of Chilkigarh.

Family	**Subfamilies**	**Genera**	**Species**
Papilionidae	1	3	7
Hesperiidae	2	5	5
Pieridae	2	6	6
Lycaenidae	2	7	7
Nymphalidae	8	14	22
TOTAL:	**15**	**35**	**47**

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UNUSUAL OVIPOSITION SITE BY A COMMON EMIGRANT *CATOPSILIA POMONA* BUTTERFLY

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On 25th October 2023, at 08:52 hrs. inside the campus of Indira Gandhi National Open University, Delhi, India (28.496499 N; 77.203228 E; elev. 278 m asl), an adult aphid was observed on a fresh Amaltas (*Cassia fistula*) leaf with a Common Emigrant's *Catopsilia pomona* (Fabricius, 1775) egg laid on its dorsal thorax. This Amaltas plant was growing beside the wall of a small artificial pond. These Amaltas plants are allowed to grow upto a certain height (approximately 20-25cm), before being pruned by gardeners, but then they regrow. Notably, Amaltas serves as the host plant for Common Emigrant butterflies.

In this particular setting, two adjacent Amaltas plants caught my attention. One of them hosted a small group of 3 to 4 caterpillars alongside several eggs of the Common Emigrant butterfly on its leaves. The neighbouring plant had clusters of eggs primarily on its fresh leaves.

While attempting to capture images of these eggs, I noticed an aphid on one of the leaves. Upon closer examination, I observed that the aphid bore a peculiar feature: a butterfly egg had been laid on its thorax by a Common Emigrant butterfly. The extra burden did not seem to hinder the aphid from moving around. There is no doubt that this is not a regular phenomenon and the egg was very likely erroneously laid on the aphid, who might simply have been in the wrong place at the wrong time.

ACKNOWLEDGEMENTS

I would like to convey my heartfelt gratitude to Mr. Sohail Madan for his tremendous support and guidance in understanding lepidoptera, their ecology and in the completion of this note. I would like to express my special thanks to our Pro-Vice Chancellor of IGNOU, Dr. Srikant Mohapatra, for providing me with his support to work towards nature within our Campus.

I am also grateful to IGNOU Nature Club, which I established in our campus for making people aware of biodiversity and their importance around them.

The completion of the note would not have been possible without their help and

insights.

Fig 1: Common Emigrants caterpillar feeding on Amaltas leaves.

Fig 2: Common Emigrant caterpillar feeding on Amaltas leaves

Fig 3: Adjacent Amaltas plant with eggs on fresh leaves

Fig 4: Common Emigrant butterfly's egg laid on aphid

Fig 5: Common Emigrant butterfly's egg laid on aphid

FIRST REPORT OF *AZANUS JESOUS* (GUERIN-MENEVILLE, 1849) (LEPIDOPTERA: LYCAENIDAE: POLYOMMATINAE) FROM CHOTANAGPUR PLATEAU, INDIA.

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ABSTRACT

Azanus jesous (Guérin-Méneville, 1849) was recorded for the first time from the Chotanagpur plateau, India with photographic evidence. The current communication helps to update the range distribution of this butterfly in India.

Key words: Bokaro, Butterfly, Chotanagpur Plateau, Distribution, Record.

INTRODUCTION

Chotanagpur plateau is situated in the eastern part of India, covering most parts of Jharkhand state, three districts (Purulia, a part of Bankura and Jhargram) of West Bengal, two districts (Mayurbhanj and Sundergarh) of Odisha and Jashpur district of Chhattishgarh (Singh, 2012; Sisodia *et al.*, 2019).The global distribution of *Azanus jesous* (Guérin-Méneville, 1849) also known as African Babul Blue is in western, southern and central parts of India to Africa, Arabia, Pakistan, Nepal, Bhutan, Myanmar and Sri Lanka and it is commonly seen in grasslands and open clearings, up to an elevation of 2100 m (Bingham, 1907; Kehimkar, 2016).

During the expedition, the first author sighted and photographed an individual of an unidentified butterfly species at Sector 1 (23.6525°N, 86.1608°E) of Bokaro Steel City (in Bokaro district), in Jharkhand using Samsung SM-A207F at 6:43 am (GMT+6.00) on 20th August 2021 (Fig. 1). The observed butterfly was prolonged roosting on a *Parthenium hysterophorus* plant, in foggy weather (Fig. 2). Later, the individual photographed was compared with photographic field guide (Kehimkar, 2016) and a key characterized by Bingham (1907). The observed individual was pale brown and had tailless hindwings. Additionally, it had a brown costal margin on the underside of the forewings, a dark chestnut-brown streak between vein 12 and the subcostal vein; and a transverse sub-terminal row of white encircled black spots. *Azanus jesous* resembles *Azanus ubaldus* but it can be distinguished by its complete series of white-ringed jet-black spots in interspace 1,2,4,5,6 and 7 on the underside of the hindwings. Moreover, a sub-terminal spot in interspace 3 and a terminal small spot in interspace 7 are present (Kehimkar, 2016; Bingham, 1907).

In India, the species is known from the Western Ghats, Kerala, Tamil Nadu, Gujarat, Rajasthan, Haryana, Uttarakhand, Madhya Pradesh, Chhattisgarh, Orissa and Bihar (Van Gasse, 2018). Also, the species was recorded from in and around Pusa (in

Bihar state) (Karthik *et al.*, 2020), which is close (aerial distance: ~263 kms) to the study area. There is no report of *Azanus jesous* from Chotanagpur plateau till the present study (Verma, 2009; Singh, 2010; Payra *et al.*, 2016; Samanta *et al.*, 2017; Boruah *et al.*, 2018; Biswas *et al.*, 2019; Dey *et al.*, 2020; Mahata *et al.*, 2020; Nayak, 2020, Mukherjee & Mondal, 2020; Dwari & Mondal, 2020; Roy *et al.*, 2021; Tandan *et al.*, 2021; Choudhary & Basu, 2022; Patra *et al.*, 2022; Mandal & Roy, 2022; Singha Deo *et al.*, 2023). Hence, this photographic record is the first report from Chotanagpur plateau region. However, the species is known to occur in Bihar and Odisha states, so the presence of this species is not highly unexpected from this region. The connecting state West Bengal (Central and Southern part) also comprises host plant *Acacia sp.* habitat similar to Bokaro region.

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Figure 1: *Azanus jesous* roosting on a *Parthenium hysterophorus* plant.

Figure 1: *Azanus jesous* was recorded from this location in the present report.

THE SMALLEST AND LARGEST KNOWN VAGRANT BUTTERFLIES *VAGRANS EGISTA* (LEPIDOPTERA: NYMPHALIDAE)

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Reviewer: Piet van der Poel

The genus *Vagrans* Hemming, 1934 is represented by one species in India, *V. egista* (Cramer, [1780]). It occurs in the foothills of the Himalaya from Jammu & Kashmir to N.E. India and also in Jharkhand and Odisha. Although it is commonest at low elevation, it occurs to 1500 m and stragglers find their way even higher.

In the last week of October, 2023, two unusually small specimens of this species were recorded by the first author at the Butterfly Research Centre in Bhimtal. Both specimens were pinned and upon being measured, the wingspan of the smaller specimen (figure 1) turned out to be much smaller than any other known specimens and therefore a new size record for the species.

The wingspan is obtained by measuring from the centre of the thorax to the forewing apex and doubling the result (Evans, 1932). Evans (1932) gives a range of 55-65 mm for the species.

It is not clear why two dwarf specimens occurred together at the same time and place, but evidently, they came from the same batch of eggs, which might have been partially starved because of a lack of food on the hostplant where they spent the larval stage.

In December of the same year, an unusually large specimen was noted by the authors and collected. Upon being measured, it was half a centimetre larger than the largest known specimen known in the literature. We present measurements and data for both these specimens below:

Vagrans egista sinha (Kollar, [1844])

Specimens examined: 2 ♂♂: Forewing length: 22 mm Expanse: 50 mm, 29.x.2023. Butterfly Research Centre, Bhimtal, Uttarakhand, 1500 m. (Figure 1); Forewing length: 32 mm Expanse: 70 mm, 21.xii.2023 Bhujiaghat (29°18.45”N’ 79°31.41”E), Nainital district, Uttarakhand, 624 m. (Figure 1). *Leg*.: Peter Smetacek & Ambica Agnihotri. *Coll*. Butterfly Research Centre, Bhimtal.

From the above it is evident that the specimens examined in this study are smaller than the smallest specimens and larger than the largest specimens measured by Evans (1932) and therefore the smaller and largest specimens represent new size records for the species. Henceforth, the wingspan of this species may be recorded

as 50-70 mm instead of 55-65 mm as given by previous authors.

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Figure 1: *Vagrans egista*, Butterfly Research Centre, Bhimtal, 29.x.2023

NEW DISTRIBUTION RECORD FOR THE RED PIERROT BUTTERFLY *TALICADA NYSEUS* (LEPIDOPTERA: LYCAENIDAE) FROM SIKKIM HIMALAYA, INDIA

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Sikkim Himalaya, located in northeast India, is renowned for its rich biodiversity, especially in the Himalayan biogeographic zone. It supports a diverse range of flora and fauna, including over 689 species of butterflies (Acharya & Vijayan, 2011). The Butterfly and Moths of Sikkim-Nature Conservation Society (BAMOS-NCS) has been started, diligently tracking and recording the various kinds of butterflies found in the Sikkim Himalayas since 2011. During a field survey on the way to 6th mile Tadong, Gangtok East Sikkim (27°31057N, 88° 59759E), on 8th November 2023, we spotted a *Talicada nyseus* (Guérin-Méneville, 1843) butterfly sitting near a car wash site at an elevation of 1600m. This small yet beautiful butterfly is known to flutter frequently in front of car mirrors and puddles near car wash areas. We took photographs (Fig. 1) of the butterfly from the spot and confirmed its identity using various reference books and online platforms. We spotted the species in an urban area, highlighting the importance of such a region in the conservation context. Urban areas may offer unique ecological niches for common or uncommon species to thrive. The area's vegetation is with associated floral species such as *Alnus nipalensis*, *Ficus* sp., and *Musa* sp. (Banana) on private land. The herb species found in the area were *Centenella* sp., *Drumeria* sp., *Eupatorium* sp., and *Artemesia* sp. The distinct black upper side of the wings, a large orange portion on the lower edge of the hindwing, and the colourful mix of white on the underside with black and orange markings make identification of *Talicada nyseus* easier (Kehimkar, 2016; Bhakare & Ogale, 2018; Smetacek, 2016). However, this is the first report of this species from Sikkim, as far as we know, and it has not been reported in existing articles on the subject (Haribal, 1992; Varshney & Smetacek, 2015; Kehimkar, 2016). Therefore, our findings will be the first scientific report to support the occurrence of *Talicada nyseus* in Sikkim, as there is no previous scientific record of the species from the state.

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Fig-1: Red Pierrot (*Talicada nyseus)* from 6th mile Tadong, East Sikkim.

ON THE CONTINUED PRESENCE OF THE REDBREAST *PAPILIO ALCMENOR* (LEPIDOPTERA: PAPILIONIDAE) AND TREEYELLOW *GANDACA HARINA* (LEPIDOPTERA: PIERIDAE) BUTTERFLIES IN KUMAON, UTTARAKHAND

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Butalia *et al*. (2020) reported the presence of *Papilio alcmenor* C. & R. Felder, [1864] in Kumaon, Uttarakhand, after a gap of more than a century. In the subsequent years, the species has been recorded sporadically. On 1.ix.2023, we recorded a male specimen of this species in Tallital market in Bhimtal, Uttarakhand. It is of the *leucocelis* form, which was also recorded in Bhatronjkhan and Mukteshwar by Butalia *et al.* (2020). However, there have not been many sightings of the species, suggesting that although the species is still present in Kumaon, it is not at the density at which it was recorded in 2020. The specimen recorded was curated the same day and deposited in the collection of the Butterfly Research Centre, Bhimtal.

Agnihotri (2022) reported a minor range extension of *Gandaca harina assamica* Moore, [1906] to the Gaula valley. This species, too, appears to have moved into the area recently. On August 16, 2023, the authors recorded around a dozen specimens of this species at the same location in Bhujiaghat, near Ranibagh, Uttarakhand, indicating that the species is still present and probably successfully breeding in the area. One voucher specimen was taken and deposited the same day in the collection of the Butterfly Research Centre, Bhimtal. The specimens observed were definitely not part of a migration, since they were flying randomly about the forest canopy. All the individuals were recorded on the western bank of the Ballia Nala, a small stream that is a tributary of the Gaula river. The hillside above the western bank of the stream is covered with dense Sal (*Shorea robusta*) forest, where these butterflies were found. The eastern bank is covered with what Osmaston (1927) classified as Miscellaneous Deciduous Forest, where not a single specimen of this species was found.

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Figure 1. *Papilio alcmenor* ♂ form *leucocelis*, Bhimtal, 1.ix.2023

Figure 2. *Gandaca harina* ♂, Bhujiaghat, 16.viii.2023

FIRST RECORD OF TWO NYMPHALID BUTTERFLIES FROM PAKISTAN

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ABSTRACT

Two species of family Nymphalidae (Brush-foots), Clinia Sailer, *Neptis clinia* (Moore, 1872) and Commodore, *Auzakia danava* (Moore, 1858) are reported from Abbotabad district of KPK Province, Pakistan. The records further extend the known range of both species westwards.

INTRODUCTION

The Commodore Butterfly (*Auzakia danava*) belongs to a monotypic Nymphalid genus and is distributed over Tibet, West China, north and north eastern India, Bhutan, Myanmar and Sumatra. 4 subspecies are recognized (Anonymous, 2020b). The nominate subspecies is found in the Himalayas (450 to 2400m altitude) from Kashmir (including Nepal and Bhutan) to Arunachal Pradesh. (Gasse, 2018). Clinia Sailer, *Neptis clinia* (Moore, 1872) is represented by 4 subspecies in India, of which ssp. *praedicta* (Smetacek, 2011) is found in the western Himalayas at 450 to 1800m from Uttarakhand, Himachal Pradesh with a single record from Dehli (Gasse, 2018).

MATERIALS AND METHODS

During exploration of the butterflies of Sherwan, Abbotabad District (KP Province) Pakistan, SHT noticed two Nymphalids butterflies previously unreported from Pakistan and photographed them together with a Nikon D7500 digital camera (Figure 1) on 9th September 2019.

(1) Clinia Sailer (*Neptis clinia* Moore, 1872): This *Neptis* Fabricius, 1807 (Figure 1) was different from other sailers known to occur in Pakistan in having upper forewing top-most discal spot elongated, cell-streak conjoined with triangular end-cell spot (versus *nata* Moore, [1858], *hylas* (Linnaeus, 1758) and *sappho* (Pallas, 1771)), upper 3 sub-marginal spots not shifted out and discal band of upper hindwing of even width (versus *soma* Moore,1858), fused forewing cell-streak and triangular end-cell spot, and a pretty broad hindwing discal band.

(2) Commodore Butterfly (*Auzakia danava* Moore, 1858): Almost double the size of the *Neptis* (Figure 1 and 2), identified as a female Commodore, on basis of its huge size and two broad creamy-white bands on its darker greyish-green wings, and dark discal and marginal bands on hindwing. Shade of the

ground color and extension of dark bands is variable in this species (Gallo & Bruna, 2013)

RESULTS AND DISCUSSIONS

These two species are new additions to the list of butterflies of Pakistan (Roberts, 2001; Tshikolovets & Pages, 2016). Trivial name of Clinia Sailer was proposed by van der Poel & Smetacek, (2022) to avoid confusion among various English names of the species. The closest known locality of this sailer is Kangra, Himachal Pradesh, India, 380 km southeast of Sherwan. The closest locations of occurrence of Commodore in India are in the union territory of Jammu and Kashmir. Moore (1874) recorded this butterfly from Jammu and Kashmir (India) for the first time without specifying any location. He reported most butterflies in this paper, from Sonamarg (200 km eastwards) in Ganderbal district. The second definite record of this insect from the union territory is from Bhaderwah (280 km in the east) Doda district, therefore, our record has expanded its range about 200-280 km to the west.

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Fig 1: Clinia Sailer and Commodore

DISTRIBUTION OF THE ZEBRA SKIPPER *ERNSTA ZEBRA* (LEPIDOPTERA: HESPERIIDAE) IN THE WILDLIFE SANCTUARIES OF RAJASTHAN

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Reviewer: Peter Smetacek

Ernsta zebra (Butler, 1888) was described from Attock (= Campbellpore) and the Kala Chitta Range (=Chittar Pahar), Pakistan (Butler, 1888; de Niceville, 1889). For over a century, these were the only known localities for this elusive butterfly. Tshikolovets & Pages (2016) added the Margalla Hills to the two known localities, which appeared to be an extremely local species, occurring in a limited area in present day northern Pakistan. Recently, it was recorded for the first time in India from Sagwara, Dungarpur Dist., Rajasthan (Panwar, 2020). After the first sighting, opportunistic surveys were conducted between 2015 and 2021 in selected wildlife sanctuaries (WLS) of Rajasthan. During the surveys, there were 17 records of the Zebra Skipper in eight wildlife sanctuaries (Table 1).

The present paper confirms that this butterfly is, in fact, quite widespread. Although at present it is known from two rather widely separated localities, namely northern Pakistan and Rajasthan, it is likely that future workers will manage to show that there are populations connecting these two areas and the butterfly is rather more widespread than presently believed.

It is a small butterfly which flies low among bushes and on the wing is identical to *Spialia galba* (Fabricius, 1793). This is probably the reason why it has been overlooked by previous workers.

Table 1: Location of the Zebra Skipper in some Wildlife Sanctuaries of Rajasthan.

Sighting No.	Wildlife Sanctuary	District	Date	GPS Co-ordinates
1.	Phulwari ki Nal WLS	Udaipur	09-08-2015	24°16′42″N 73°15′12″E
2.			31-03-2018	24°14′40″N 73°17′09″E
3.	Sita Mata WLS	Pratapgarh and Chittaurgarh	17-05-2015	24°13′25″N 74°25′55″E
4.			15-03-2020	24°17′03″N 74°29′53″E
5.	Kumbhalgarh	Rajsamand	01-11-2020	25°05′18″N 73°27′37″E

6.	WLS		20-03-2021	25°05′24″N 73°27′36″E
7.			02-12-2022	25°05′12″N 73°27′34″E
8.	Todgarh Raoli WLS	Ajmer, Pali and Rajsamand	23-10-2019	25°28′35″N 73°52′15″E
9.			21-03-2021	25°42′48″N 73°56′34″E
10.	Bassi WLS	Chittorgarh	10-11-2018	25°01′39″N 74°48′43″E
11.	Sajjangarh WLS	Udaipur	04-03-2015	24°35′49″N 73°38′16″E
12.			14-08-2016	24°35′44″N 73°38′22″E
13.			26-08-2019	24°36′01″N 73°38′27″E
14.	Jaisamand WLS	Udaipur	03-08-2017	24°16′22″N 73°52′44″E
15.			13-09-2019	24°16′25″N 73°52′46″E
16.			27-08-2021	24°16′15″N 73°52′38″E
17.	Mount Abu WLS	Sirohi	26-05-2019	24°36′44″N 74°40′10″E

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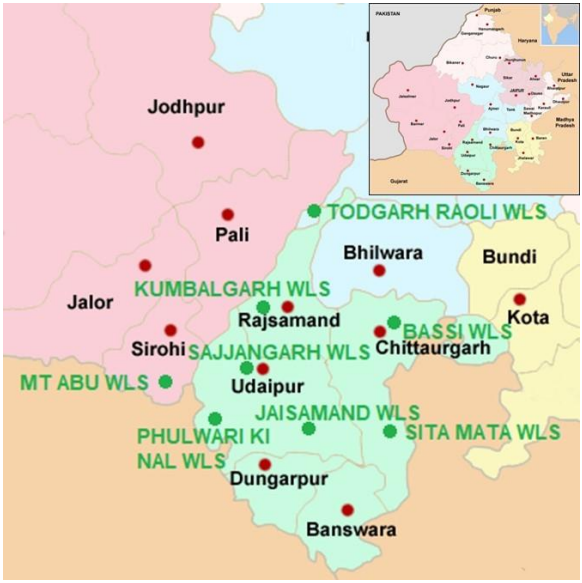

Figure 1: Locations of Wildlife Sanctuaries where *Ernsta zebra* has been recorded

HOST PLANT AND NECTAR PLANTS OF THE ZEBRA SKIPPER *ERNSTA ZEBRA* (LEPIDOPTERA: HESPERIIDAE) IN RAJASTHAN, INDIA

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Ernsta zebra (Zebra Skipper) is distributed in parts of Pakistan and Rajasthan, India (Tshikolovets & Pages, 2016; Panwar, 2020). Other than the restricted distribution, no information is available on the host plants, life cycle stages, and nectar plants. Between 2014 and 2023 opportunistic surveys were undertaken to gather data on the species.

On 8th November 2014, an adult female of the Zebra Skipper was seen ovipositing on the underside of a leaf of *Melhania futteyporensis* Munro ex Mast (Malvaceae), in Sagwara, Dungarpur (Rajasthan). After a few days, caterpillars of the Zebra Skipper were seen feeding on the leaves of *M. futteyporensis*, confirming that it is the larval host plant. During the study period, different life cycle stages of the butterfly were observed on the plant. Also, the caterpillars were collected and raised on the plant's leaves (Figures 1a to 1l). *M. futteyporensis* (Pic 2a and 2b) is endemic to the Indian subcontinent and it is also among the threatened plants of India (Barik *et al*., 2018). It is a small shrub with simple, broad ovate to lanceolate and serrated leaves, and yellow flowers, growing in arid to semi-arid regions in gravelly soil to rocky terrain.

During the survey period, the nectar plants of the Zebra Skipper were also recorded. The skipper was observed nectaring upon a wide range of plants including 23 species belonging to 15 families (Table 1; Pic 3 a to 3w). The butterfly was observed to be on the wing in January, February, March, July, August, September, October and November suggesting that there are at least two and perhaps three generations during the year. It is unusual that a butterfly with such an extended flying period has been overlooked for so long.

Table 1: List of Nectar Plants of the Zebra Skipper

S. No.	Family	Scientific Name	Common Name	Habit
1	Acanthaceae	*Justicia procumbens* L.	Water Willow	Herb

2	Amaranthaceae	*Digera muricata* (L.) Mart.	False Amaranth	Herb
3		*Celosia argentea* L.	Plumed Cockscomb	Herb
4	Apocynaceae	*Wrightia antidysenterica* (L.) R.Br.	Snowflake	Shrub
5	Asteraceae	*Cyanthillium cinereum* (L.) H.Rob.	Little Ironweed	Herb
6		*Tagetes erecta* L.	Marigold	Herb
7		*Tridax procumbens* L.	Coatbuttons	Herb
8	Cucurbitaceae	*Cucumis melo* L.	Melon	Climber
9	Euphorbiaceae	*Jatropha integerrima* Jacq.	Spicy Jatropha	Shrub
10	Fabaceae	*Cajanus scarabaeoides* (L.) Thouars	Showy Pigeon Pea	Shrub
11		*Crotalaria medicaginea* Lam.	Trefoil Rattlepod	Herb
12	Lamiaceae	*Mesosphaerum suaveolens* (L.) Kuntze	American Mint	Herb
13		*Ocimum basilicum* L.	Basil	Herb
14		*Tectona grandis* L.f.	Teak	Tree
15	Malvaceae	*Melhania futteyporensis* Munro ex Mast	Fatehpur Melhania	Shrub
16		*Sida cordifolia* L.	Bala	Herb
17		*Waltheria indica* L.	Boater Bush	Herb
18	Nyctaginaceae	*Boerhavia diffusa* L.	Common Hogweed	Herb
19	Passifloraceae	*Turnera ulmifolia* L.	Yellow Alder	Herb

20	Rhamnaceae	*Ziziphus mauritiana* Lam.	Indian Jujube	Small tree
21	Rubiaceae	*Spermacoce articularis* L.f.	False Buttonweed	Herb
22	Verbenaceae	*Lantana camara* L.	Lantana	Shrub
23	Vitaceae	*Causonis trifolia* (L.) Mabb. & J.Wen	Fox Grape	Liana

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Fig 1: *Justicia procumbens*

Fig 2: *Digera muricata*

Fig 3: *Celosia argentea*

Fig 4: *Wrightia antidysenterica*

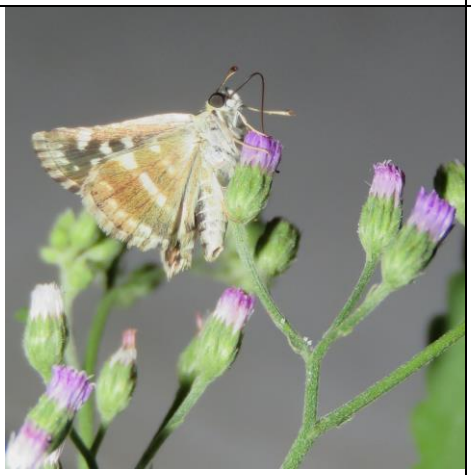

Fig 5: *Cyanthillium cinereum*

Fig 6: *Tagetes erecta*

Fig 7: *Tridax procumbens*

Fig 8: *Cucumis melo*

Fig 9: *Jatropha integerrima*

Fig 10: *Cajanus scarabaeoides*

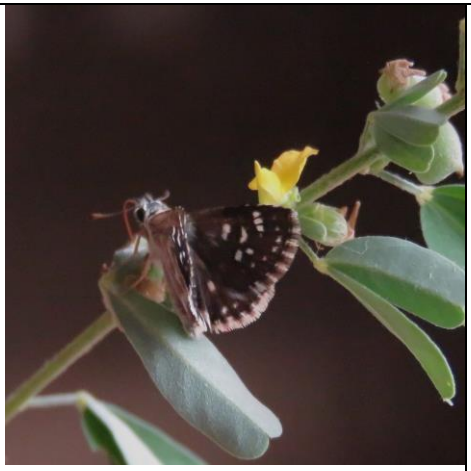

Fig 11: *Crotalaria medicaginea*

Fig 12: *Mesosphaerum suaveolens*

Fig 13: *Ocimum basilicum*

Fig 14: *Tectona grandis*

Fig 15: *Melhania futteyporensis*

Fig 16: *Sida cordifolia*

Fig 17: *Waltheria indica*

Fig 18: *Boerhavia diffusa*

Fig 19: *Turnera ulmifolia*

Fig 20: *Ziziphus mauritiana*

Fig 21: *Spermacoce articularis*

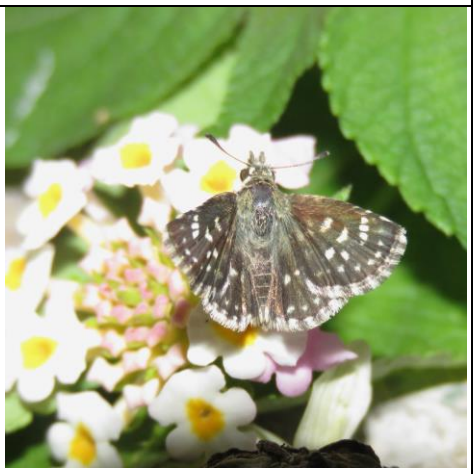

Fig 22: *Lantana camara*

Fig 23: *Causonis trifolia*

Host Plants of Zebra Skipper

Fig 1*: Melhania futteyporensis*

Fig 2: *Melhania futteyporensis*

Life cycle of Zebra Skipper

Fig 1: Egg

Fig 2: First instar larva

Fig 3: Second instar larva

Fig 4: Third instar larva

Fig 5: Penultimate larval stage

Fig 6: Ultimate larval stage

Fig 7: Pre-pupation stage

Fig 8: Pupa

Fig 9: Pre-eclosion pupal stage

Fig 10: Pre-eclosion pupal stage

Fig 11: *Ernsta zebra* adult

A REMARKABLY SMALL SPECIMEN OF *ABISARA BIFASCIATA* (LEPIDOOPTERA: RIODINIDAE) FROM UTTARAKHAND, INDIA

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Abisara bifasciata Moore, 1877 is a widespread butterfly, which occurs from the central Western Ghats northwards to the Himalaya, northeast India and the Andaman Islands. It primarily resides in dense broadleaf forest at low elevation, with stragglers rarely ascending to 1500 m in the Himalaya.

In Manipur, the species was documented in Lailok (Lokchao Wildlife Sanctuary) at an altitude of 264 m, within a forest characterized by a combination of evergreen and deciduous tree species (Irungbam *et al*., 2020)

Evans (1932) measured Indian butterflies and these measurements remain the standard for known size of species and subspecies. This measurement was obtained by measuring the butterfly from the centre of the thorax to the forewing apex and doubling the result, assuming bilateral symmetry. In the case of *A. bifasciata*, Evans (1932) treated 5 subspecies from the Indian subcontinent under the name *Abisara echerius* (Stoll, [1790]): *A. e. prunosa* Moore, 1879; *A. e. angulata* Moore, [1879]; *A. e. suffusa* Moore, 1882; *A. e. bifasciata* Moore. Bennett (1950) separated *A. bifasciata* and *A. echerius*, leaving *A. bifasciata angulata*, *A. b. suffusa* and *A. b. bifasciata* from the Indian subcontinent, while the taxa *prunosa* and *paionea* Fruhstorfer, 1914 (treated by Evans (1932) under *Abisara kausambi* Felder & Felder, 1860) were treated under *A. echerius*.

For *A. bifasciata suffusa*, Evans (1932) gave a wingspan of 40-50 mm while *A. bifasciata bifasciata*, the wingspan was reported as 50-55 mm. Therefore, the established wingspan for *A. bifasciata*, at least on the Indian subcontinent, is 40-55 mm.

We present a notably small specimen of *A. bifasciata*, measured using Evans' (1932) method mentioned above, which adds to the known range of size of the species, illustrated in Figure 1 below.

Material examined: 1 ♂. Forewing length: 18 mm; Expanse: 38 mm. 16.viii.2023 Bhujiaghat (29°18.45"N' 79°31.41"E), 624 m above msl, Nainital district, Uttarakhand, India. *Leg*.: Peter Smetacek & Ambica Agnihotri. *Coll*. Butterfly Research Centre, Bhimtal.

Remarks: This unusually diminutive specimen contributes to our understanding of the wingspan range achievable by this species. Instead of the previously documented 40-55 mm, the known wingspan of this species is now revised to 38-55 mm.

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Figure 1. *Abisara bifasciata* male, Bhujiaghat, 16.viii.2023

MODIFICATIONS TO THE KNOWN EXPANSE OF SOME OAKBLUE BUTTERFLIES *ARHOPALA* (LEPIDOPTERA: LYCAENIDAE) FROM INDIA

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Reviewer: Piet van der Poel

The genus *Arhopala* Boisduval, 1832 (Lepidoptera: Lycaenidae) is represented by 48 species in India (Varshney & Smetacek, 2015). They are largely inhabitants of dense broadleafed forests, from low elevations to nearly 2600 m and are common in suitable habitats. Some species are known to swarm in summer.

Evans (1932) presented a range of wingspans or expanses for each butterfly species, based on a single measurement for each specimen. He measured the distance from the centre of the thorax to the tip of a forewing apex in millimetres and doubled the result.

While examining the reference collection at the Butterfly Research Centre, Bhimtal, some unusual specimens were noted and measured, following the method above. The results are presented below:

Arhopala rama (Kollar, [1844]) (Figure 1)

A. rama rama (Kollar, [1844])

Material examined: 1 ♂: Forewing length: 14 mm; Expanse: 30 mm. 2.ii.2023 Butterfly Research Centre, Bhimtal, Uttarakhand 1500 m. *Leg*.: Peter Smetacek; *Coll*. Butterfly Research Centre, Bhimtal, Uttarakhand.

Remarks: This is the smallest specimen of the species recorded so far. Evans (1932) gives an expanse range of 38-40 mm for the west Himalayan subspecies *A. r. rama*, and 34-40 mm for the east Himalayan subspecies *A. r. ramosa* (Evans, 1925). Taking the abovementioned specimen into account, the new measurement for *Arhopala rama* is 30-40 mm and the new measurement for *A. rama rama* is 30-40 mm. However, the measurement for *A. r. ramosa* remains the same as mentioned in Evans (1932), i.e. 34-40 mm.

Arhopala dodonea (Moore, [1858]) (Figure 1)

Material examined: 1 ♀: Forewing length: 21 mm; Expanse 46 mm. Butterfly Research Centre, Bhimtal, Uttarakhand, India 1500 m. 24.x.1993. *Leg*.: Peter Smetacek; *Coll*. Butterfly Research Centre, Bhimtal, Uttarakhand.

Remarks: This is the largest specimen of *A. dodonea* known. Evans (1932) gives an expanse of 38-44 mm for the species. The specimen examined in this study has an expanse of 46 mm, 2 mm larger than the largest specimen measured by Evans (1932). Therefore, the new measurement for the expanse of this species is 38-46 mm.

Arhopala ganesa (Moore, [1858]) (Figure 1)

Material examined: 1 ex.: Forewing length: 13 mm; Expanse: 28 mm. Butterfly Research Centre, Bhimtal, Uttarakhand, 1500 m. 21.v.1994. *Leg*. Peter Smetacek. *Coll*. Butterfly Research Centre, Bhimtal, Uttarakhand.

Remarks: This is the smallest known specimen of this species. Evans (1932) gives an expanse of 32-37 mm for the species. The present specimen is 4 mm smaller. The known expanse for the species therefore is 28-37 mm.

Arhopala atrax (Hewitson, 1862) (Figure 1)

Material examined: 1 ♂: Forewing length: 15 mm; Expanse: 32 mm. Kaladhungi, Uttarakhand, 400 m. 2.v.1994. *Leg*. Peter Smetacek. *Coll*. Butterfly Research Centre, Bhimtal, Uttarakhand.

Remarks: This is the smallest known specimen of this species. Evans (1932) gives an expanse of 34-40 mm for the species. The present specimen is 2 mm smaller. The known expanse for the species therefore is 32-40 mm.

DISCUSSION

Some west Himalayan *Arhopala* species overwinter as adults and it is not unusual to see *A. dodonea*, *A. rama* and *A. ganesa* active on sunny days during January and February, when almost no other butterflies are on the wing. Recently, *A. paraganesa* (de Niceville, 1882) was also recorded in mid-winter, suggesting that it, too, overwinters as an adult (Smetacek & Sayed, 2023). This has a.bearing on the minimum size of species mentioned above. In multi-brooded species, such as *Papilio polyctor* Boisduval, 1836, the spring brood, whose larval stage was spent during the autumn and winter, are often small, the pre-Monsoon brood larger and the post Monsoon brood the largest. However, this does not come into play with *Arhopala* species that overwinter as adults. The smallest specimens have eclosed from larvae that did not manage to get much food. The larval hostplant of *A. rama*, *A. dodonea* and *A. ganesa* is the Himalayan Silver Oak *Quercus leucotrichophora*. Thus. there is an abundance of food available for them the whole year, unlike for butterfly species that feed on annual herbs and shrubs.

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Figure 1: *Arhopala* specimens mentioned in the text above. Butterfly Research Centre, Bhimtal

CONFIRMATION OF *PROSOPIS CINERARIA* AS LARVAL HOST PLANT OF THE COMMON GRASS YELLOW BUTTERFLY *EUREMA HECABE* (LINNAEUS, 1758) (INSECTA: LEPIDOPTERA: PIERIDAE) IN INDIA

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The Common Grass Yellow (*Eurema hecabe* (Linnaeus, 1758)) is widespread across Asia, Africa and Australia. In India, *E. hecabe* is a very commonly found butterfly throughout the country. In India, it uses several plants of the family Fabaceae as larval host plants, namely *Acacia*, *Aeschynomene americana*, *Albizia*, *Albizia procera*, *Albizia saman*, *Caesalpinia*, *Caesalpinia mimosoides*, *Caesalpinia pulcherrima*, *Caesalpinia sappan*, *Cassia*, *Cassia fistula*, *Senna tora*, *Mimosa pudica*, *Moullava*, *Moullava spicata*, *Peltophorum pterocarpum*, *Pithecellobium dulce*, *Senna alata*, *Senna obtusifolia*, *Sesbania*, *Sesbania bispinosa*, *Sesbania grandiflora*, *Sesbania sesban*, *Smithia conferta*, *Smithia sensitiva* (Fabaceae) (Nitin *et al*., 2018).

The present communication reports rearing of *E. hecabe* on *Prosopis cineraria* (Mimosaceae), confirming this plant as larval host plant of Common Grass Yellow butterfly in India.

E. hecabe was found ovipositing on *Prosopis cineraria* saplings grown in Aranaya native nursery, Gurugram. The butterfly is commonly found in the region with both the Aravali Biodiversity Park and Aravali Nagar Van being adjacent to the nursery, where *Prosopis cineraria* is widespread across the region. A freshly laid egg of *E. hecabe* 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 August-September, 2023. The egg was collected on 26th August and hatched on 28th August (3rd day after ovipositing). The egg hatched on 28th August and presence of a caterpillar in the container was ascertained from the presence of frass. The caterpillar was reared by feeding fresh leaves of *Prosopis cineraria*. A pupa was found on 6th September 2023, 12 days from the date of rearing the egg (Figure 1-6) and an adult *E. hecabe* eclosed on 12th September 2023 (6 days after pupation).

The total duration of the life cycle of *E. hecabe* was 18 days. The observed longer larval and pupal stages in the present study could be due to lower ambient temperature and fluctuating humidity prevalent in the month of September. The above observations confirms *Prosopis cineraria* as larval host plant of *E. hecabe* in India. Looking at the list of larval host plants reported previously (Robinson *et al*., 2010; Nitin *et al*., 2018), this is clearly a new record of the larval host plant for *E. hecabe*.

ACKNOWLEDGEMENTS

The author would like to express his gratitude towards his parents for trusting him, and special thanks to Mr. Sohail Madan for his endless support and guidance in identifying the species and helping the author rear and monitor the whole life cycle of the species. Author is grateful to Mr. Vijay Dhasmana of "The Rewilders", Ms. Preeti Sanwalka, Mr. Anil Kumar Thakur, Mr. Ritik Kumar Thakur and the whole team of Iamgurgaon for their constant support and motivation.

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Fig 1: Eggs of Common Grass Yellow on *Prosopis cineraria.*

Fig 2: Close up of Common Grass Yellow egg

Fig 3: Caterpillar of Common Grass Yellow on *Prosopis cineraria*.

Fig 4: Common Grass Yellow caterpillar 4th instar.

Fig 5: Common Grass Yellow pupa

Fig 6: Freshly eclosed Common Grass Yellow.

Fig 7: Upperside of Common Grass Yellow bred on *Prosopis cineraria* .

Fig 8: Underside of Common Grass Yellow bred on *Prosopis cineraria*

WESTERNMOST RECORD OF *MILETUS CHINENSIS* (LEPIDOPTERA: LYCAENIDAE) FROM JEOLIKOTE, UTTARAKHAND, INDIA

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Reviewer: Piet van der Poel

The genus *Miletus* Huebner, [1819] is represented by 2 species in India, *M. chinensis* C. Felder, 1862 and *M. symethus* (Cramer, 1777). *M. chinensis* occurs in the foothills of the Himalaya from Uttarakhand to Assam and in Manipur (Varshney & Smetacek, 2015). Although it is a low elevation species, it has been reported at 1500 m near Bhimtal in Uttarakhand (Smetacek, 2012).

In the third week of September, 2020, some rapidly flying, unidentified Lepidoptera were observed near the Range Forest Office in Gaja Forest Research Nursery, Jeolikote, Uttarakhand (29°21'05.3"N; 79°28'38.2"E, 1200 m elevation) at dusk. It was not possible to photograph them, since they did not settle. Two specimens were taken and identified at the Butterfly Research Centre, Bhimtal, as *M. chinensis*. The specimens have been deposited in the collection of the Butterfly Research Centre, Bhimtal.

Miletus chinensis assamensis (Doherty, 1891) (Figure 1)

Expanse: 32-38 mm (Evans, 1932)

Material examined: 2 ♂♂: Expanse: 32-34 mm; 20.ix.2020, Gaja Forest Research Nursery, Jeolikote, Nainital district, 1200 m. Leg.: A. Agnihotri. Coll.: Butterfly Research Centre, Bhimtal.

DISTRIBUTION

Uttarakhand to Assam, Manipur.

REMARKS

Smetacek (2012) reported this species from Jones Estate (29°33'98"N; 79°58'78"E), near Bhimtal, which is the westernmost published record for the taxon. Jeolikote lies still further west of Jones Estate (roughly 8 km as the crow flies) and therefore the current records represent the westernmost records for this species.

M. chinensis feeds on aphids in the larval stage and occurs sporadically when there is an outbreak of aphids on plants. Chemical control of aphids is disastrous for this species. This might explain why it is so uncommon in the present century when potent insecticides are routinely sprayed over large tracts of land.

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Figure 1: *Miletus chinensis* Gaja, Jeolikote 20.ix.2020

UNUSUAL RECORD OF A MALE GOLDEN BIRDWING BUTTERFLY *TROIDES AEACUS* (LEPIDOPTERA: PAPILIONIDAE) IN RAJASTHAN, INDIA

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Reviewer: Peter Smetacek

The Golden Birdwing *Troides aeacus* (C. & R. Felder, 1860) is a widespread butterfly, with a known distribution from Uttarakhand, India along the Himalaya to N.E. India, the Malay peninsula, Indo-China and Taiwan (Shirozu, 1960). It feeds on leaves and fruit of *Aristolochia* species in the larval stage (Smetacek, 2011). Smetacek (2011) has shown that the altitudinal distribution of this species along the Himalaya is determined by the presence of its larval hostplant. Therefore, although the species occurs at 40 m elevation in Assam, in the western Himalaya it is not generally found below 1600 m, the lowest elevation at which the larval hostplant is found, with occasional stragglers as low as 1200 m. It has never been reported from the Terai-Bhabar area, which is the low-lying area adjoining the foothills of the Himalaya in Uttarakhand and Nepal.

On 25 September 2023, at 8 am, a single male of this species was photographed (figures 1-3) near Sariska Tiger Reserve at Utsav Camp, Murlipura village (27.2596868 N 76.4606907 E), Tehla-Tlab Rajgarh, Alwar, Rajasthan.

This is an extremely unusual record, since the closest known habitat for this species is in Nainital, Kumaon, Uttarakhand, more than 350 km as the crow flies from Sariska. The butterfly arrived from the north, settled on the flowers of *Tectona grandis* for around 2 minutes, during which time it was photographed since MP was already photographing *Hasora chromus* (Cramer, [1780]), *Suastus gremius* (Fabricius, 1798), etc, which were gathered on the flowers before the unexpected arrival of the *T. aeacus*.

It was noted that the butterfly was flying from north to south. While some Himalayan species like *Pieris brassicae* (Linnaeus, 1758), *P. canidia* (Linnaeus, 1768), *Colias fieldii* Menetries, 1855, *Aglais caschmirensis* (Kollar, [1844]) have been recorded from Delhi as winter migrants from the hills, there is no record for a summer migrant from the hills to the plains of India.

Normally, females help disperse the species, and it is unusual for a single male to be found so far from its known habitat. However, although no conclusions can be drawn from the presence of *T. aeacus* in Rajasthan in September, the fact that it was observed there is worth placing on record in the hope that workers might obtain further records and gain insight into the movement of this species in the coming years.

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Figure 1: *Troides aeacus* male, Utsav Camp, Murlipura village

Figure 2: *Troides aeacus* male, Utsav Camp, Murlipura village

Figure 3: *Troides aeacus* male, Utsav Camp, Murlipura village on *Tectona grandis* flowers

HIMALAYAN WOODBINE *PARTHENOCISSUS HIMALAYANA* (ROYLE) PLANCHON (FAMILY VITACEAE) – AN ECOLOGICALLY UNDERRATED WOODY LIANA IN THE MONTANE MOIST CONIFEROUS FOREST IN SHIMLA CITY (HIMACHAL PRADESH, INDIA)

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ABSTRACT

Changes in abiotic factors like light, temperature, humidity and soil moisture cause rapid proliferation of lianas infragmented forests in urban areas. Controlling the abundance of lianas through manual removal has to be regulated as the fruits of lianas are an important food source in temperate forests. Photo-documentation of frugivory on *P. himalayana* through direct observation highlights the importance of this liana species for birds and mammals.

Keywords: Temperate, Liana, Fragmentation, Frugivory, Urban forests, Urban Planning

INTRODUCTION

Climbing plants are a substantial component of the plant community in a forest. Climbers can be divided into three categories - herbaceous vines, woody shrubs and woody vines (lianas) (Kokou *et al*., 2002). Herbaceous vines climb to a few feet, and are not able to reach the canopy of the host tree. Woody shrubs climb without tendrils or adventitious roots, using fissures in the bark of host trees. Lianas are mostly woody, tall (up to 30 m) and may reach up to the canopy of host trees (Jongkind & Hawthorne, 2005).

Climbers play a significant ecological role in carbon sequestration and controlling soil erosion (Klinge & Rodriguez, 1973; Putz, 1983). Lianas help maintain the micro-climate in a forest. Liana species diversity provides niches and contact amongst trees, which allows arboreal animals to travel among the tree tops. Climber species contribute to the diet of numerous animals (Sarvalingam *et al*., 2015).

Lianas are a functional group characterized by great morphological and anatomical plasticity, which enables them to adapt to a wide range of conditions (Rowe & Speck, 2005). Most lianas are not physiologically well adapted to cold climates (as the structure of their vascular system increases the risk of freezing-induced xylem embolism (Ewers *et al*., 1991; Schnitzer, 2005)). To reduce this mortality risk, several temperate lianas in the genera *Vitis*, *Parthenocissus* and *Toxicodendron* display early bud set and leaf senescence, which result in a shorter active growth season compared to other woody species of the same climate (Stiles, 1982). Several

liana species can spread horizontally, growing among herbaceous forest-floor communities, and remain self-supporting until conditions change (e.g., increased light and support availability) (Selaya & Anten, 2008).

Very few studies have been done on climbers in India. In tropical forests, 25% of woody plants diversity is contributed by lianas (Schnitzer & Carson, 2001), and yet they are unnoticed in many forest records and in forest ecological practices (Phillips *et al*., 2005). The low attention to lianas is possibly due to general absence of taxonomic studies. [Polunin & Stainton (1984) mention Vitaceae species are 'difficult to distinguish in the field'. A new phylogenetic classification of Vitaceae has been published in 2018 (Wen *et al*., 2018)]. Moreover, climbers are weeded out in silviculturally managed forests; therefore, they are a threatened group of plants, and need to be documented. (Rahman *et al*., 2020).

Forest fragmentation reduces species richness, and in more isolated fragments, affects the movement of animals. Fragmentation impacts ecological functions such as seed dispersal, and decreases ecosystem services such as carbon sequestration, pollination and nutrient cycling (FAO & UNEP, 2020). Several studies (Schnitzer & Carson, 2001; Londré & Schnitzer, 2006; Ladwig & Meiners, 2010a).show that lianas proliferate rapidly in fragmented and disturbed forests. Forest fragmentation causes the tree canopy to open up, which increases light-availability and raises ambient temperature**.** These are probably the main reasons for the increasing abundance of lianas in disturbed ecosystems worldwide (Schnitzer & Bongers, 2011). In secondary tropical and temperate forests, lianas are typically more abundant than in primary forests and can be a natural part of succession, increasing over 30–70 years post disturbance, before declining (Capers *et al*., 2005; Letcher & Chazdon, 2009; Ladwig & Meiners, 2010; Letcher, 2015). In secondary forests, data from Amazonia and Panama show that liana biomass can increase (from 5-10% (Schnitzer & Bongers, 2011; Van der Heijden *et al*., 2013)) to 30% of total woody biomass (Gerwing & Farias, 2000). In extreme cases, lianas may even dominate the woody vegetation following temperate forest disturbance (Fike & Niering, 1999; Royo & Carson, 2006).

Habitat fragmentation in urban landscapes is characterized by small remnants of vegetation patches insulated from each other by an anthropized matrix. Concentration of impervious surfaces creates urban heat islands (UHI). UHI can induce thermal and hydric stress and phenological changes in sensitive species (Godefroid & Koedam, 2007; Grimm *et al*., 2008; White *et al*., 2002; Zhang *et al*., 2004). A study (Bergeron & Pellerin 2014) found that the richness of indigenous pteridophytes was lower in urban forests affected by UHI, likely because UHI cause soil dryness. Lianas are not physiologically drought-resistant species (van der Sande *et al*., 2013). However, they usually have a deep and extensive root system that enables them to get water from deeper sources of ground water, which could give them an advantage in dry conditions (e.g., Jackson *et al*., 1995; Schnitzer, 2005). The relatively high temperatures and low humidity in disturbed forest habitats (edges, gaps, young forests) (Murcia, 1995; Collinge, 1996) result in elevated evapo-transpiration, giving lianas a competitive advantage. In a study (Brice *et al*., 2014) conducted in the forests of the metropolitan Montréal area (Quebec, Canada) on six liana species, it was found that lianas benefited from urbanization. Lianas were more abundant in disturbed forests and in edge habitats than in less

disturbed forest and core habitats (Brice *et al*., 2014). In another study conducted in Queensland, Australia in five forest fragments (23–58 ha in area) and five nearby intact-forest sites, fragmented forests had a significant increase in liana abundance (Campbell *et al*., 2018).

Urban forests are important habitats for native biodiversity. The urban forests in Shimla are fragmented patches of various sizes, separated by urban roads and/or built spaces. So far, ten species of climbers have been recorded in the city forests and open meadows which are reported in the present paper[Table 1]. Three of these climbers are woody lianas (*Parthenocissus, Hedera* and *Pergularia*) that reach up to the canopy of deodar trees(*Cedrus deodara*). Extensive colonisation of deodar host trees by lianas (mainly *Parthenocissus himalayana* (Vitaceae) and *Hedera nepalensis* (Araliaceae)) was observed in one such forest patch in Kasumpti locality of the city.

Public messages and campaigns are conducted from time to time to weed out vines from urban forests in Shimla, and from elsewhere in the state. These campaigns do not mention which species of woody liana needs to be weeded out. Also, the reason for proliferation of native lianas in city forest patches – i.e. fragmentation – is not addressed in these campaigns (Himachal Watcher (2016, 2020), Tribune News Service (2023)).

Table 1. Climbers observed in the urban forests of Shimla.

Species	**Family**	**Habit**
1. *Hedera nepalensis*	Araliaceae	Liana
2. *Parthenocissus himalayana*	Vitaceae	Liana
3.*Pergulariaroylei*	Apocynaceae	Liana
4. *Clematis buchananiana*	Ranunculaceae	Woody shrub
5. *Clematis connata*	Ranunculaceae	Woody shrub
6. *Rosa brunonii*	Rosaceae	Woody shrub
7.*Trichosanthes*sp.	Cucurbitaceae	Herbaceous climber
8. *Rubia cordifolia*	Rubiaceae	Herbaceous climber
9. *Dioscorea* sp.	Dioscoreaceae	Herbaceous climber
10. *Ipomoea purpurea*	Convolvulaceae	Herbaceous climber

METHODS

Study Area

The photo documentation of feeders on *Parthenocissus himalayana* berries was conducted in September 2023 through direct observation at Kasumpti locality (31.07°N, 77.18°E) (1960 m), in Shimla city (c.1,800– 2,500 m), Himachal Pradesh, India situated in the Western Himalayas amid the Himalayan Moist Temperate Forest type (forest classification according to Champion and Seth, 1968). The author photographed the species from her apartment balcony overlooking the Kasumpti forest.The species feeding on the fruiting liana were photographed with a digital camera from time to time, as they appeared on the liana-draped deodar trees. The author has surveyed the forest patches in the city for flora and fauna for more than a decade.

Documented Liana Species

The plant species *Parthenocissus himalayana* (Royle) Planchon (Family Vitaceae) is a large woody climber. It is distributed from Pakistan to Sikkim, S.W. China and Burma in coniferous forests at 1800-3300 m. *P. himalayana* flowers April-May, and sets fruit from August to September. Leaves trifoliate with three ovate long-pointed, sharply toothed, stalked leaflets, which are shining dark green above and pale beneath, lateral leaflets asymmetrical. Flowers yellow-green, in spreading flat-topped clusters. Petals c. 5mm, petals and stamens 4-5. Leaflets mostly 10 cm, bristly-haired on the veins beneath, Tendrils branched. Berry black, c. 8 mm, ripen in September (Polunin & Stainton, 1984).

RESULTS

The fruits of *P. himalayana* were seen to be consumed by seven avian species and two mammalian species. The bird species included resident species, local migrants and long-distance migrants. [Table 2, Figure 1].(Two of the species photographs were taken earlier from the same location in 2014 and 2016).

Table 2. Species observed feeding on the berries of *P. himalayana* in Kasumpti locality.

Species	**Scientific name**	**Status**	**Feeding Guild**
Birds			
1. Slaty-headed Parakeet	*Psittacula himalayana*	Resident	Frugivore
2. Great Barbet	*Psilopogon virens*	Resident	Frugivore
3. Wedge-tailed Green Pigeon	*Treron sphenurus*	Summer migrant	Frugivore
4. Himalayan Bulbul	*Pycnonotus leucogenys*	Resident	Insectivore
5. Black Bulbul	*Hypsipetes*	Local migrant	Omnivore

	leucocephalus		
6. Brown-fronted Pied Woodpecker	*Dendrocopos auriceps*	Resident	Insectivore
7. Red-billed Blue Magpie	*Urocissa erythrorhyncha*	Resident	Omnivore
Mammals			
8. Himalayan Langur	*Semnopithecus schistaceus*	Resident	Herbivore
9. Rhesus Macaque	*Macaca mulatta*	Resident	Herbivore

DISCUSSION

Frugivore assemblages

Frugivorous birds have been much less frequently studied compared to other feeding guilds. Studies suggest that frugivory may be more common than expected in non-tropical habitats (e.g. Herrera & Jordanao, 1981; Herrera, 1984). A species is classified as a 'frugivore' if >50 percent of its diet comprises of fruits. Studies on frugivory use direct observations, fruit-fall traps and camera traps. Camera traps enable observation of animals that are highly sensitive to human presence, and of nocturnal animals (Tongkok *et al*. 2020). Mammals, birds, reptiles and insects are consumers and dispersers of seeds of fleshy fruits in temperate forest ecosystems (Willson, 1991; Koike & Masaki, 2019; Tongkok *et al.* 2020).

Jayasekara *et al*.(2007) in the tropical rainforests of Sri Lanka used automatic cameras to monitor frugivore visits at 15 species of fruiting trees (including a woody vine), recording visits to piles of fruits placed in the arboreal and on the terrestrial layers. They recorded 23 animal species at the fruiting trees, out of which seven were bird species (Not all the known local frugivore bird species were, however, captured by the automatic camera). The study found that frugivore assemblages differed between arboreal and terrestrial layers, and between diurnal and nocturnal periods. Birds were the dominant component of the diurnal assemblage and mammals dominated the nocturnal assemblage.

It is likely that several more of the bird species from Kasumpti locality, including residents and summer migrants, consume berries of *P. himalayana* (for a list of bird species in Kasumpti, see Chauhan & Jolli, 2022). Eight other species of mammals previously recorded by the author in Kasumpti forest (one species each of deer, mongoose, marten, weasel, gliding squirrel, jackal, bat, and rodent) may also be consumers of the berries.

Seasonality of fruiting

Spatiotemporal patterns of fruit availability in forests have been studied (e. g. Fogden, 1972; Karr, 1976) local fluctuations being more evident with increasing latitude. In temperate forests,

fruit bearing plants are mostly concentrated in clearings and forest-edges (e.g. Auclair & Cottam, 1971; Herrera, 1984), and fruit production is concentrated during autumn and winter. In seasonal tropical forests, it is concentrated during the rainy season (Naoe *et al*., 2018). In a study (Majeed *et al*., 2022) conducted on climber species in semi-mountainous Jhelum District (Punjab, Pakistan) at elevation ranging up to 1000m, majority of the climber species were found to flower during the months of March–April (28.04%), followed by August–September (26.31%). This was similar to the observations made in the Pakistani Himalayas and in the Kashmiri Himalayas in India (Majeed *et al*., 2022). Among the ten climbers recorded in the urban forests of Shimla in the present study, about half the species bloom in summer and the other half in the monsoons.

Feeding guilds and migration

Patchy distribution of fruits in time and space causes long periods of fruit scarcity over vast areas, and resultant diet and habitat shifts in the avian fauna (Foster 1977). Year-round frugivory is almost absent in temperate birds (Herrera, 1984). Frugivore species composition also change seasonally, particularly in temperate regions (Naoe *et al*., 2018; Chauhan & Jolli, 2022). Frugivory is common in temperate forest birds in North America and is most prevalent during late summer and autumn, the season of southward migration of many bird species. In a three-year study conducted in Illinois, US on eight bird-dispersed shrubs and vines, it was found that the 11 bird species studied tended to concentrate on one or two particular fruit species each year (Malmborg & Willson, 1988).

Several species of herbs/shrubs/trees bearing small fleshy fruits/seeds/nuts in different seasons were seen to be consumed by birds across feeding guilds in Kasumpti.*P. himalayana* and *R. brunonii* bear abundant clusters of fleshy berries (rose-hips in the case of the latter) that ripen just when the summer migrant bird species such as the Wedge-tailed Green Pigeon are preparing to migrate to the Indian plains. (See a list of summer migrants in Chauhan & Jolli, 2022. A few more species were recorded in 2021-2023).These two climber species no doubt provide the birds with calories to help them migrate. There are two species of resident frugivore birds in Kasumpti – Great Barbet and Slaty-headed Parakeet. The latter migrates to adjacent lower altitude forests in the dead of winter, and reappears periodically when the weather improves. On the other hand, species like the Black Bulbul are mobile over a larger area, and appear in the Kasumpti forest from time to time.

Forest fragmentation and lianas

Globally, forest fragments (up to 100 ha) are estimated to possess 13%–75% less diversity than comparable non-fragmented forests (Haddad *et al*., 2015), with the majority of the lost diversity often being the most iconic components, such as large mammals and trees (Chiarello, 1999; Gibson *et al*., 2013; Laurance, 1997b; Laurance *et al*., 2000; Oliveira *et al*., 2008). Nevertheless, in the tropics, forest fragments provide a repository for the preservation of many rare and endangered species and threatened ecosystems. Forest fragments should therefore, not only be retained, but managed effectively, which necessitates an understanding of their ecology. One of the major ecological interactions altered by the relationship between trees and lianas. A decrease in canopy cover, which is found on forest edges or in tree-fall gaps, is well known to favour liana proliferation (Schnitzer & Carson, 2001, 2010; Schnitzer *et al*., 2000, 2014). which detrimentally impacts trees

and modifies functioning of forest fragments (by limiting seedling recruitment Schnitzer & Carson, 2010; Schnitzer *et al*., 2000), damaging saplings and decreasing tree growth and fecundity (Stevens, 1987), competing with trees for limited resources (Pasquini *et al*., 2015; Reid *et al*., 2015; Rodríguez-Ronderos *et al*., 2016; Schnitzer *et al*., 2005), increasing tree mortality (Ingwell *et al*., 2010), reducing carbon storage capacity (Durán & Gianoli, 2013; van der Heijden *et al*., 2013; Schnitzer *et al*., 2014), re-distributing nutrients (Kazda, 2015; Powers *et al*., 2004; Schnitzer & Bongers, 2011), altering tree-species composition (Clark & Clark, 1990; Laurance *et al*., 2001; Schnitzer & Bongers, 2002), threatening epiphytic ferns (Magrach *et al*., 2014), and limiting or changing the trajectory of tree-species succession within treefall gaps (Schnitzer & Bongers, 2005; Schnitzer & Carson, 2001, 2010; Schnitzer *et al*., 2000). Thus, understanding the ecological interactions between lianas and their host trees is critical for successfully managing remnant forest fragments (Campbell *et al*., 2018). Another study states that many lianas do not have significant adverse effects on their host trees, and indeed in some cases can facilitate forest recovery following disturbance. Many lianas help to protect forests from extreme weather, fire and weed invasion resulting in a "bandage effect" that allows tree seedlings to survive and grow where they might otherwise die (Campbell *et al*., 2015, Marshall *et al*., 2020).

Several studies (Vidal *et al.,* 1997, Parren & Bongers, 2001, Emmons & Gentry, 1983) on the effectiveness of liana cutting recommend selective liana cuttingas opposed to blanket liana cutting. Many studies warn against blanket liana cutting in managed forests because lianas provide essential food and much needed canopy structure to many forest animals. Large lianas in primary forest in tropical lowlands form liana tangles that are crucial for threatened understorey animals (Michel *et al*., 2015). Liana cutting is only appropriate for excessively abundant, structural parasitoid species in heavily disturbed areas, where they are most likely to arrest succession.Further research is needed to quantify the approximate level at which the density or biomass of lianas in a tree becomes problematic (Schnitzer & Bongers, 2002; Marshall *et al*., 2020). Also, it will be useful to know the percentage of host trees (that carry liana species) in primary moist coniferous forests in the western Himalaya, in order to help decision-making for managing lianas in urban forest fragments.

Native lianas are a part of the forest ecosystem in Shimla, and have only proliferated due to fragmentation of the habitat. Any management of woody lianas has to be carefully done after identifying the forest patches that show proliferation (e.g. more than 80% trees hosting woody lianas) and the liana species to be controlled. Instead of uprooting the lianas growing on mature host trees, a method of pruning of lianas should be devised so that they may grow back in the spring. Smaller trees (e.g. < 6 inches DBH) especially those planted in afforestation drives in open areas, are affected more by woody lianas, therefore, these should be prioritised for liana removal. Langurs and macaques cause heavy defoliation of woody lianas when they are feeding in an area, and are an effective natural control.

CONCLUSION

Light, temperature, humidity and soil moisture are important factors that affect the species composition on the forest floor. Liana abundance is affected by these factors. Control measures of liana abundance in urban forests should bear in mind the importance of lianasas a source

of food to the vertebrate fauna. Measures to prevent forest fragmentation should be devised; and habitat restoration should be implemented in urban forests.

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Fig 1: Slaty-headed Parakeet

Fig 2: Great Barbet

Fig 3: Wedge-tailed Green Pigeon

Fig 4: Wedge-tailed Green Pigeon, female

Fig 5: Himalayan Bulbul

Fig 6: Black Bulbul

Fig 7: Red-billed Blue Magpie

Fig 8: Himalayan Langur

Fig 9: Rhesus Macaque

CEROPEGIA SAHYADRICA: A NEW LARVAL FOOD PLANT OF PLAIN TIGER *DANAUS CHRYSIPPUS* L. (LEPIDOPTERA: NYMPHALIDAE)

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ABSTRACT

The study reports the first ever observed butterfly-plant interaction for a vulnerable plant species *Ceropegia sahyadrica* Ansari & B.G.P. Kulk. The plant is endemic to Northern Western Ghats otherwise known as Sahyadri range hence the plant's name. Plain Tiger *Danaus chrysippus* larvae was observed feeding on the leaves of *C. sahyadrica* which has been documented and discussed for the first time here.

Keywords: Apocynaceae, *Ceropegia*, Larval Food Plant, Nymphalids

The Nymphalidae butterflies are known to have their host plants in the plant family Apocynaceae, especially Danainae butterflies, also known as milkweed butterflies (Wynter-Blyth, 1957; Kunte, 2000; Robinson *et al*.; 2010; Nitin *et al*., 2018). These butterflies are also known to feed on ecologically important and rare species within the Apocynaceae family. One such genus under this family is *Ceropegia* L., 1753. *Ceropegia* spp. in Indian sub-region such as *Ceropegia attenuata* Hook., *Ceropegia bulbosa* Roxb., *Ceropegia evansii* McCann, *Ceropegia fantastica* Sedwg., *Ceropegia hirsuta* Wight & Arn., *Ceropegia intermedia* Wight, *Ceropegia lawii* Hook. f., *Ceropegia vincifolia* Hook., are reported previously as the larval host plant of several Nymphalidae members such as *Danaus chrysippus chrysippus* (Linnaeus, 1758), *Danaus genutia genutia* (Cramer, [1779]), and *Parantica aglea aglea* (Stoll, 1782) (Table 1).

Among these Danaids, the most migratory and widespread butterfly is *D. chrysippus* or the Plain Tiger butterfly (Smetacek, 2001; Kehimkar, 2016). However, this species is reported to have only two larval host plants in the genus *Ceropegia* viz. *C. lawii* & *C. vincifolia* (Table 1) and it's interactions with the other *Ceropegia* spp. of India remains unknown and unreported till date. This study reports the first ever observation of Plain Tiger caterpillars feeding on *C. sahyadrica*.

Table 1. A list of Butterflies (Nymphalidae: Danainae) and their larval host plants from the genus *Ceropegia* based on literature and observations (Nitin *et al*., 2018 and Lovalekar *et al*., 2023).

Sr No	Nymphalids (Danaids)	Larval Host (*Ceropegia* spp.)
1	*Danaus chrysippus*	*C. lawii, C. vincifolia*
2	*Danaus genutia*	*C. attenuata, C. evansii, C. fantastica, C. hirsuta, C. intermedia, C. lawii, C. media, C. vincifolia*
3	*Parantica aglea*	*C. bulbosa, C. evansii, C. hirsuta, C. lawii, C. media, C. vincifolia*

During our field visit to Sinhagad Fort, Pune on 27th June 2023, we came across two individual of plants that attracted our attention. Upon closer examination, the plant was identified as *Ceropegia sahyadrica* Ansari & B. G. Kulkarni (1971:688) (Kambale & Yadav, 2019). We observed two caterpillars actively feeding on both the plant specimens, one was younger and one was matured i.e.,the caterpillars were of different instars. This was observed during the advent of rainy season and we were unsure whether the plant was previously reported as the larval host of Plain Tiger at the time of the visit. The plant fall into 'Vulnerable' category (Gore *et al*., 2014; Shigwan *et al*., 2020) therefore we did not collect leaves of the specimen along with the caterpillar for rearing. After a fortnight the site was visited again in search of further larval stages but there were no signs of it. This might be due to continuous heavy rains in the region. Therefore, the full life cycle was not observed on the plant. It was inferred that the plant is an unreported larval host plant from the fact that two different instars of the butterfly were feeding on the leaves.

Ceropegia belong to the milkweed family and are the species of concern from the point of view of its distribution, ecology, and vulnerability. The fact that they are larval host plants of a few danaine butterfly species and this observation adds new information to the known larval hosts plants of *D. chrysippus*,

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Fig. 1. (A) *Ceropegia sahyadrica* in its habitat — High elevation hill slopes (Captured at Sinhagad Fort). (B) *Danaus chrysippus* larva on *C. sahyadrica*. (C) Young caterpillar feeding on leaves (D) Matured caterpillar. (Photo credits: Ameya Deshpande & Chintan Bhatt)