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Rediscoveries of dusky yellow-breasted flat *Gerosis phisara* Moore (Lepidoptera: Hesperiiidae) and angled Pierrot *Caleta decidia* hewitson (Lepidoptera: Lycaenidae) from Uttarakhand

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Abstract

In this paper, we have documented the rediscovery of two butterflies: Dusky Yellow-breast Flat *Gerosis phisara* (Moore, 1884) and Angled Pierrot *Caleta decidia* (Hewitson, 1876) from a hilly state Uttarakhand of India. *Gerosis phisara* was rediscovered from the Nalena site of Nainital district, about 70 years after Evans documented it from Uttarakhand. Similarly, *Caleta decidia* was rediscovered from the Nandhaur Wildlife Sanctuary (NWLS) of Uttarakhand about 80 years after Peile recorded it from the Kumaon region. The findings presented here are based on the random surveys carried out in various parts of Nainital districts from July 2016 to November 2018. During a survey of butterflies on the outskirts of the Nalena village in Nainital district of Uttarakhand state on 14 August 2016, our attention was caught by a butterfly basking on a stone near a water stream at 12:39 hrs (IST), 975 meters above sea level (asl). This butterfly was photographed properly and identified as Dusky Yellow-breast Flat *Gerosis phisara*. A total of 05 specimens were recorded from various sites of study areas during the study period (July 2016 to November 2018). A single specimen of Angled Pierrot *Caleta decidia* was observed near a water stream on October 14, 2018, at 11:30 hrs (IST) in Machli van, during a two day survey carried out in the Nandhaur Wildlife Sanctuary of Uttarakhand from 14 to 15 October 2018. The forest types of NWLS have been classified as ranging from semi-evergreen to mix deciduous with a predominance of *Sal Shorea robusta*. Both the species were photographed from different angles to get enough photographs to confirm the identification of the species. There is a gap of nearly seven decades in updating distribution records and hence claiming the rediscovery of these rare butterflies is justified. Hence, these records are helpful for updating the status and distribution of the butterfly fauna in Uttarakhand.

Keywords: Biology, brinjal, *Leucinodes orbonalis*, morphometry

1. Introduction

Uttarakhand, a hilly state of India, which lies to the west of Nepal and shares its boundary with China occupied Tibet, hosts a significant proportion of India's butterfly diversity, where many species are endemic; some of them are very rare and have no recent records. Evans ^[2] has recorded approximately 450 species of butterflies from this region. During the past two decades, there are many reports of rediscoveries and range extensions for several species of butterflies from this small state Uttarakhand, indicates that there is a lot to learn about the status and distribution of this faunal group. Some of the butterflies which were recently reported from Uttarakhand are *Delias acalis* Godart ^[12], *Pontia daplidice* Linnaeus and *Pontia glauconome* Klug ^[13], *Talicauda nyseus* Guérin Menéville ^[9], *Zesius chrysomallus* Hübner ^[10], *Nacaduba kurava* Moore, *Flos asoka* de Nicéville and *Arhopala abseus indicus* Riley ^[14]. Beside it *Matapa sasivarna* Moore ^[6], *Anthene emolus* God art & *Caltoris kumara* Moore ^[7] and *Heteropsis malsara* Moore & *Pelopidas agna* Moore ^[8] are some new and significant records for Uttarakhand. A number of surveys were organized from July 2016 to November 2018 in different sites of Nainital district to understand the diversity and status of rare butterflies in Nainital district. The two butterflies named as Dusky yellow-breast flat *Gerosis phisara* and Angled Pierrot *Caleta decidia* were rediscovered after a long time and hence new additions into the checklist of butterflies of Uttarakhand.

2. Materials and Methods

2.1 Study area

Dusky Yellow-breast Flat *Gerosis phisara* was first photographed at the outskirts of Nalena

village, when it was basking on a stone near a water stream. The location is in Nainital district of Uttarakhand and 20 kilometers apart from the district headquarters. The Nainital district occupies the southern portion of the Kumaon division (28°44'N-30°49'N, 78°45'E-81°01'E). To its north is Almora district and to its south lies the Udham Singh Nagar district. Champawat district flanks it in the east and district of Pauri Garhwal is in the west. Geographically Nainital district is heterogeneous; its northern portion consists of hills and the southern portion of the alluvial plain called Bhabar. The study site is dominated by two species of oak: *Quercus leucotrichophora* and *Quercus floribunda*; Himalayan cypress *Cupressus torulosa* and deodar *Cedrus deodara*. Among oaks, Banj (*Quercus leucotrichophora*) is most common. The belt contains mostly evergreen forests. This region has numerous streams; water fills them up during the whole year, due to which it is an ideal habitat for most of the rare butterfly species of Uttarakhand. We have recently reported two new butterfly species for Uttarakhand- Black veined branded redeye *Matapa sasivarna* and Blank Swift *Caltoris kumara* from the same area [6, 7].

Angled Pierrot *Caleta decidia* was photographed at Machli van in the Nandhaur Wildlife Sanctuary of Uttarakhand. This sanctuary lies between the river Gola & river Sarla and intersected by the river Nandhaur, which flows east to west in the northern area. It covers 269.96 km² and lies between

North latitudes 28°56'29.35" to 29°16'39.79" and between east longitudes 79°33'3.82" to 80°10'0.03". The sanctuary has numerous streams inside it and water fills them up during the summer. This sanctuary is located in two districts namely Nainital and Champawat district of Uttarakhand. The majority of the NWLS lies in Haldwani forest division of Nainital district. Geographically, most of the portion of this sanctuary falls in the region of alluvial plain, called Bhabar. The Nandhaur Wildlife Sanctuary is a very rich area in terms of biodiversity. The area has more than 100 species of trees, 30 species of shrubs and 20 species of climbers and grasses. The area has 27 different forest types and sub-types when classified according to the Champion and Seth forest classification. The area is predominately Sal forest (*Shorea robusta*) covering about 70% of its area. Besides it, it also has Shisham (*Dalbergia sissoo*), bamboo (subfamily *Bambusoideae*), Teak (*Tectona grandis*), Chir pine (*Pinus roxburghii*) and riverine forest. Due to its diverse plant wealth, it supports high butterfly diversity and species richness. The area is also home to about 25 species of mammals, 250 species of birds, 15 species of reptiles and 20 species of fishes.

We have recently reported two new butterfly species for Uttarakhand, *Heteropsis malsara* Moore & *Pelopidas agna* Moore from this wildlife sanctuary [8].

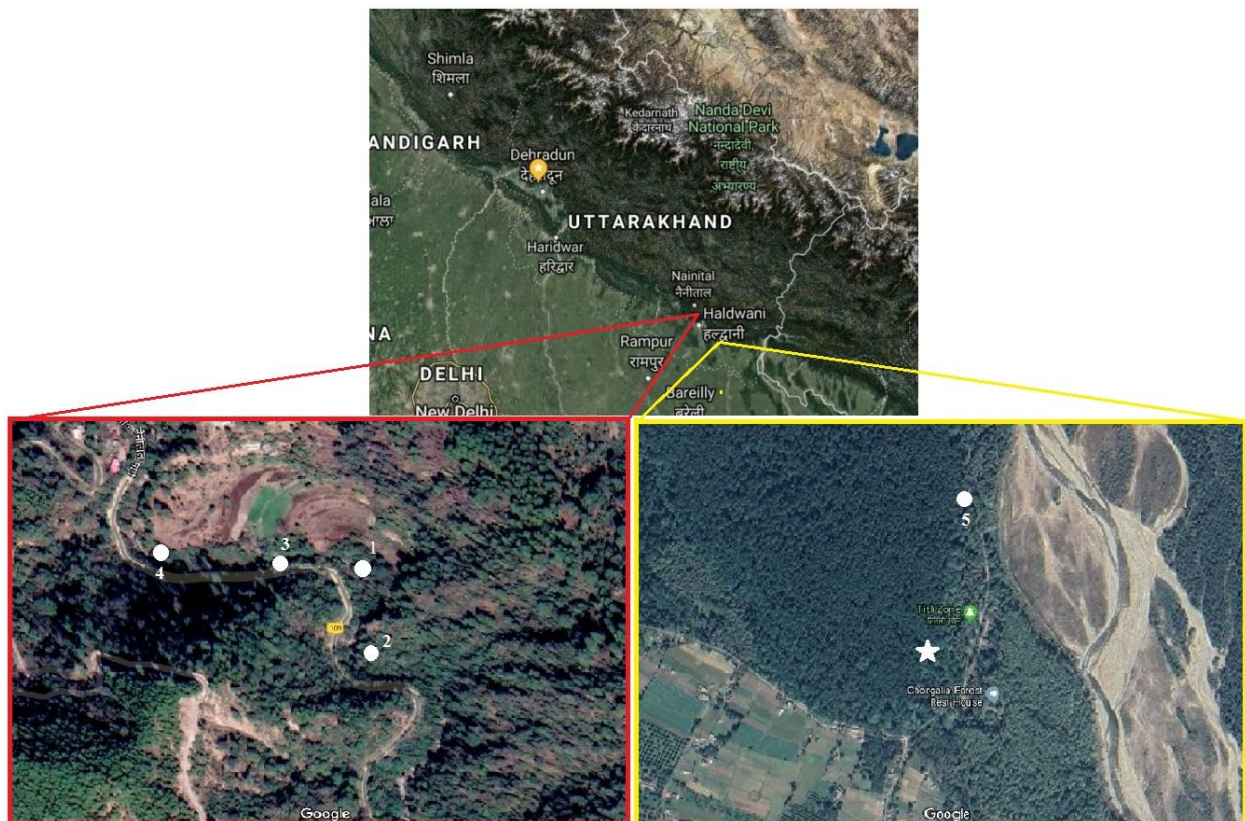


Fig 1: Map of the study area (bottom left and right are Nalena & NWLS sites, respectively). White dots show the sites where Dusky Yellow-breast Flat *Gerosis phisara* were recorded and the site where Angled Pierrot *Caleta decidia* was recorded marked as a star. Courtesy-Imagery ©2018 Terra metrics, Map data ©2018 Google.

2.2 Methodology

A number of surveys were completed with an aim to map the ecological distribution of various rare butterfly species found in Nainital district of Uttarakhand. These surveys were carried out at various spots within the study area by point and line transect methods [1]. The number of individuals encountered

along the line transect were counted and details of location/site, activities, date, habitat, altitude and GPS coordinates were noted for each species. During the survey, Dusky Yellow-breast Flat *Gerosis phisara* and Angled Pierrot *Caleta decidia* were recorded and photographed by a digital single-lens reflex (DSLR) camera using a 70-300 mm lens.

Identifications were confirmed with the help of literature by Evans (1932) ^[2], Wynter-Blyth (1957) ^[17] and Kehimkar (2016) ^[5].

3. Results and Discussion

3.1 Dusky Yellow-breast Flat *Gerosis phisara* (Moore, 1884)

Dusky Yellow-breast Flat *Gerosis phisara* (Moore, 1884) is a small butterfly belonging to the Hesperidae (Skippers) family. In India, there is only a single subspecies *ssp. phisara* (Moore, 1884) listed under this species. According to Varshney and Smetacek ^[16], this species is found from Uttarakhand to northeast India and Odisha. Globally it is found in Nepal, Bhutan, Bangladesh, and Myanmar ^[5]. It is listed as "Not rare" by Paul Van Gasse ^[4] ranging Similipal hills, Odisha, Kumaon to Arunachal, northeast India, northeast and southeast Bangladesh, and Burma.



Fig 2: Dusky Yellow-breast Flat *Gerosis phisara* photographed at Nalena, Nainital

A single specimen of this species was last recorded and documented from the Kumaon region of Uttarakhand by Evans ^[3] nearly 70 years ago. He listed the distribution of this species as Kumaon east to eastern Himalaya, northeast India, and Odisha. Our sighting of this species is the first one reported since then; therefore it constitutes a rediscovery of the species in the state Uttarakhand of India.

A total of 05 specimens were recorded from various sites during the study period (July 2016 to November 2018). A single specimen of Dusky yellow-breast flat *Gerosis phisara* was first recorded (*fig. 2*) when it was basking on a stone near a water stream at 12:39 hrs (IST) on 14 August 2016 at Nalena, Nainital (29°20'14.38" N and 79°29'27.33" E). The second specimen was also recorded from the same site, it was basking on a leaf near the similar stream at 10:00 hrs (IST) on 28 August 2016 (29°20'12.29" N and 79°29'26.73" E). The third and fourth specimens were also recorded from the same site at 11:28 hrs (IST) on 26 March 2017 (29°20'15.75" N and 79°29'19.78" E) and 09:30 hrs (IST) on 17 September 2018 (29°20'15.69" N and 79°29'22.56" E), respectively. The last sighting was made at NWLS (29° 8' 9.08" N and 79° 42' 13.76" E) at 09:30 hrs (IST) on 15 October 2018 during a two-day survey carried out from 14 to 15 October 2018. We suspect this species is not as rare as previously thought, but its status in Uttarakhand can be reliably assessed only after further studies are conducted. Map (*fig. 1*) shows the particular sites marked by white dots, where *Gerosis phisara* was reported. These sites are labeled as 1, 2, 3, 4 & 5 in order

of the sightings of this species. The above sightings prove that the Dusky yellow-breast flat has two broods in a year.

Angled Pierrot *Caleta decidia* (Hewitson, 1876)

Angled Pierrot *Caleta decidia* (Hewitson, 1876) is a member of family Lycaenidae. It has only a single subspecies in India, i.e. *Caleta decidia decidia* (Hewitson, 1876). According to Varshney and Smetacek ^[16], it is distributed in Peninsular India, Sikkim to northeast India. Evans ^[2] described this species *Castalius caleta*, with subspecies *hamatus*, range Sri Lanka, and *decidia*, range South India, Sikkim-Burma. Paul Van Gasse ^[4] added its range from South Gujarat, Madhya Pradesh, Chhattisgarh, Jharkhand, and Odisha. The global distribution of this species is from Nepal, Bhutan, Bangladesh, Myanmar, and Sri Lanka.

Our sighting of this species is only the second record of the species in the past 81 years throughout its range in Uttarakhand. It was last recorded by Peile ^[15] in 1937 in the Kumaon region of Uttarakhand and found it common at 300 meters. There is no other record of this species in the literature or preserved specimens from Uttarakhand ^[16].



Fig 3: Angled Pierrot *Caleta decidia* photographed at Nandhaur Wildlife Sanctuary, Uttarakhand.

A single individual of Angled Pierrot *Caleta decidia* was photographed (*fig. 3*), when it was mud-puddling along a densely wooded stream through a deciduous forest. This sighting was made at 13:30 hrs (IST) on 14 October 2018, in Machli van, NWLS, Uttarakhand (29° 7' 59.70" N and 79°42' 9.2088" E).

4. Conclusion

The rediscovery of these two new butterflies also needs to be understood in the context of the lack of past surveys in the region. It has also indicated the need to undertake detailed surveys including behavioral studies on least known butterflies in areas such as the NWLS that have been hitherto unsurveyed. There are at least 51 species of butterflies ^[11], which have no recent records in Uttarakhand. Most of them are lowland butterflies. Due to the lack of proper scientific data related to habitat, exact elevation distributions and spot records, flight periods, early stages and larval host plants of these 50+ species is hampering their conservation. Lack of proper attention, a limited number of butterfly researchers and lack of awareness are the main reasons behind the uncertainty relating to the status of butterflies in this state. These records show the importance of conserving the low altitude forest of

Uttarakhand. These forests are facing problems of deforestation, illegal boulder mining, fuel wood extraction, poaching and diversion of forest land for non-forestry related development activities. A new generation of research scientists should be trained and supported in the development projects to protect the future of butterflies of Uttarakhand. This area holds immense potential for developing ecotourism focused around butterfly watching and conservation. In short, these records are significantly important in updating the status and distribution of these species in Uttarakhand.

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