

Sightings of *Gonepteryx amintha tibetana* Nekrutenko, 1968 (Lepidoptera: Pieridae: Coliadinae) from Arunachal Pradesh, India: an addition to Indian butterfly fauna erroneously placed in southeastern Tibet earlier

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The genus *Gonepteryx* Leach, 1815 consists of nine species found throughout Europe, Africa and Asia (Beccaloni et al. 2003; Ratnasingham et al. 2007). Of these nine species, three species are hitherto reported from the Indian subcontinent, *G. rhamnii*, *G. mahaguru* and *G. farinosa*, while six other species *G. amintha*, *G. aspasia*, *G. carnipennis*, *G. cleobule*, *G. cleopatra*, and *G. eversi* are extra-limital (Talbot 1939; Savelle 2013). Two subspecies of *Gonepteryx* are usually listed as found within India. The Common Brimstone *G. rhamnii nepalensis* Doubleday, 1847 is recorded throughout the Himalaya from Kashmir east to Kumaon, Nepal, Sikkim and Arunachal Pradesh and the hill ranges of northeastern India. The Lesser Brimstone *G. mahaguru mahaguru* Gistel, 1857 is recorded from Jammu and Kashmir east to Nepal. In neighbouring countries to India, bordering northeastern India, *G. mahaguru zaneoides*

de Niceville, 1897, is reported from upper and western Myanmar while *G. rhamnii burmensis* Tytler, 1926 is recorded from the southern Shan states in Myanmar (Talbot 1939). The Powdered Brimstone *G. farinosa chitralensis* Moore, 1905 is only recorded from Chitral District in Pakistan. However, this overlooks the Tibetan Brimstone (proposed common English name) *G. amintha tibetana* Nekrutenko, 1968 whose holotype was collected by Ludlow at Lalung, Pachakshiri, 7000 ft. (2100m), southeastern Tibet, on 06 May 1938. Pachakshiri is nowadays known as Mechuka and is a region located on the upper tributaries of the Siyom River, West Siang District, Arunachal Pradesh, India. We recorded *G. amintha tibetana* from Eaglenest Wildlife Sanctuary, West Kameng District, western Arunachal Pradesh and from Anini, Upper Dibang Valley District, northern Arunachal Pradesh.

Material and methods: Dr. Ramana Athreya initiated the Eaglenest Biodiversity project in 2003 (Athreya 2006). While the initial surveys focussed primarily on the avifauna and herpetofauna of the area, lepidopteran surveys at Eaglenest Wildlife Sanctuary were conducted over a three-year period from May 2009 to April 2012, and are continuing. During this period, the area's butterfly and moth diversity and density were assessed as part of a project funded by Rufford Small Grants (http://www.ruffordsmallgrants.org/rsg/projects/sanjay_sondhi). The methodology adopted for the butterfly survey was visual encounter surveys along



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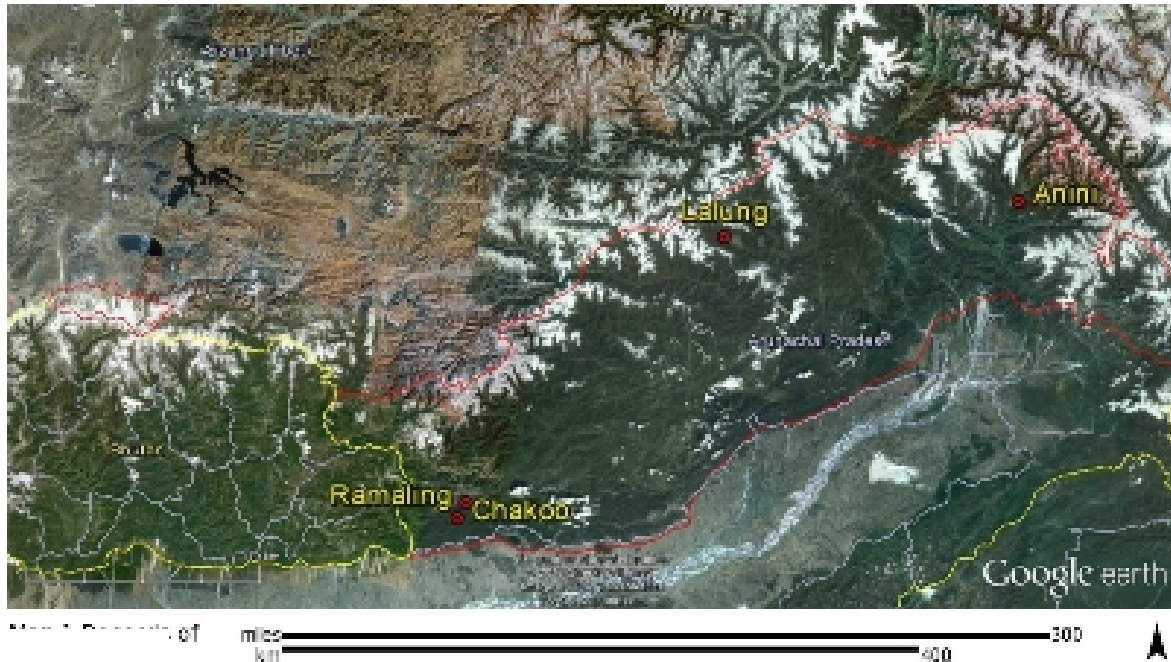


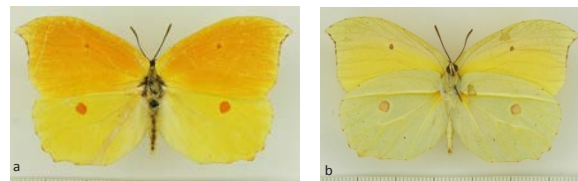
Image 1. Records of *Gonepteryx amintha thibetana*

fixed trails accompanied by photo-documentation of the butterflies seen. For cryptic species, the butterflies were netted, photographed and released. Permission for conducting the biodiversity assessments was received from the Arunachal Pradesh Forest Department vide letter no CWL/G/13 (17)/06-07/12-14 dated 6 January 2010.

The Lepidoptera survey at Eaglenest WLS was conducted over three years over the following time periods 21–28 May 2009, 1–10 October 2010, 27–29 March 2011, 20–29 May 2011, 20–26 September 2011 and 20–26 April, 2012 involving 35 days of field work.

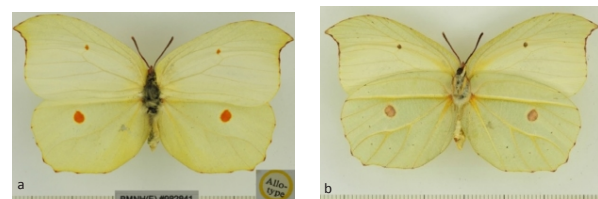
For comparison with other *Gonepteryx* species and subspecies known from the Indian region, specimens at the Natural History Museum, London were examined. Measurements and descriptions of the various *Gonepteryx* species and subspecies are based on specimens in the collection and existing literature (Talbot 1939; Nekrutenko 1973) (Images 2 & 3).

discussions: *G. amintha* was described by Blanchard in 1871. Since then, six subspecies of *G. amintha* have been described. Of these, *G. amintha thibetana* was described by Nekrutenko in 1968 with the type locality of Lalung, Pachakshiri, collected in 1938 by Ludlow. We first sighted *G. amintha thibetana* below Lama camp (27°10.171'N & 92°27.492'E) at 10:31hr on 20 April 2012 at an altitude of 2,100m. This was an individual whose underside was photographed, but not netted, hence its



BMNH(E) #062840
S.E. TIBET
Lalung, Pachakshiri,
20 April 1938
Ludlow & G. Shortt,
S. XVII no. 753

Gonepteryx amintha thibetana Nekrutenko, male holotype. a - UP; b - UN



BMNH(E) #062841
S.E. TIBET
Lalung, Pachakshiri,
20 April 1938
Ludlow & G. Shortt,
S. XVII no. 753

Gonepteryx amintha thibetana Nekrutenko, female paratype. a - male UP; b - male UN



Gonepteryx amintha thibetana
Nekrutenko, 1958
Male
BMNH(E) #982924
Del. D. C. Lees 20 June 2012

Gonepteryx amintha thibetana Nekrutenko, male, near Anini c. 1830m, Dibang Valley District, Arunachal Pradesh, 19 July 1987, coll. by Purnendu Roy UP/UN.

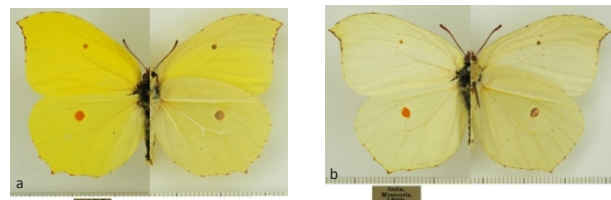
Image 2. *Gonepteryx amintha thibetana*. © Trustees of the Natural History Museum, London; used with permission

sex could not be confirmed, though it, is likely to be a male based on its wing coloration. The second sighting of butterfly was a male, sighted at 10:51hr, a few hundred meters away from the first sighting. This individual was netted and examined. A third sighting of a male occurred at 09:25hr on 21 April 2012. This individual was seen flying along the path between Chakoo and Bompu ($27^{\circ}05.128'N$ & $92^{\circ}24.361'E$) at an estimated altitude of 2417m. The butterfly was not seen during previous surveys conducted in the same area. Image 1 shows the records of this species covered in this paper.

An earlier unreported record of the same species involved a collection of a butterfly by the second author, during a visit to Anini ($28^{\circ}47.733'N$ & $95^{\circ}54.116'E$), Upper Dibang Valley District, northern Arunachal Pradesh in July 1987 at an altitude of 1,830m. This specimen (No. 982924), collected near Anini ($28^{\circ}48.6'N$ & $95^{\circ}54.6'E$) is now at the Natural History Museum, London.

The six subspecies of *Gonepteryx* that have been hitherto reported from the Indian region and the countries surrounding northeastern India are *G. farinosa chitralensis*, *G. rhamni nepalensis*, *G. rhamni gilgitica*, *G. rhamni burmensis*, *G. mahaguru mahaguru* and *G. mahaguru zaneoides* (Talbot 1939). Males of these subspecies can be separated from *G. amintha thibetana* based on external morphology alone with the size, wing coloration and shape being significant differentiators. Table 1 provides the key to separate these subspecies and their known distributions within the Indian region. Image 2 shows the male and female specimens of *G. amintha thibetana*, while Image 3 shows the male and female specimens of the other subspecies in the Indian region. Image 4 shows live individuals of *G. amintha thibetana*, *G. rhamni nepalensis* and *G. mahaguru mahaguru* from India.

The males of *G. amintha thibetana* (Image 2 & 4) recorded from Eaglenest and Anini may easily be separated from all subspecies listed in Table 1 as none of them have orange-yellow fore wings with a large discocellular orange spot on the upperside of the hind wing and a large brown discocellular spot on the underside of the hind wing. The wingspans of *G. mahaguru* and *G. farinosa* are significantly smaller than *G. amintha*. *G. amintha thibetana* has a crinkled hind wing with a small projection at v4, much smaller than both *rhamni* and *mahaguru*. The orange-yellow fore wings contrast strongly with the yellow hind wings in flight so it is quite surprising that this species has been overlooked. The wing shape is also very distinctive and will serve to separate the female from both *G. rhamni* and *G. mahaguru*.



Gonepteryx rhamni nepalensis Doubleday. a - UP/UN male; b - UP/UN female



Gonepteryx rhamni burmensis Tytler. c - UP/UN male



Gonepteryx mahaguru mahaguru Gistel. d - UP/UN male; e - UP/UN female



Journal of the Asiatic Society of Bengal vol. 66 (1897) Plate 1



Journal of the Asiatic Society of Bengal vol. 66 (1897) Plate 1

Gonepteryx mahaguru zaneoides de Nicéville. f - UP/UN male; g - UP/UN female



Gonepteryx farinosa chitralensis Moore. h - UP/UN male; i - UP/UN female



Image 3. Subspecies of *Gonepteryx* from the Indian region.

(a) *Gonepteryx rhamni nepalensis* Doubleday - male, Narkundah, Kashmir, October 1888; (b) *G. r. nepalensis* Doubleday - female, 5600ft (1706m), Mussoorie, 16 April 1914; (c) *G. r. burmensis* Tytler - male, 3800ft?(1140m), S. Shan State, Myanmar, 20 July 1924; (d) *G. mahaguru mahaguru* Gistel - Male, Thundiani (Thandiani, Galyat), 13 August 1886; (e) *G. m. mahaguru* Gistel - female, Simla, September 1931; (f) *G. m. zaneoides* De Nicéville - male, Southern Chin Hills, Myanmar; (g) *G. m. zaneoides* De Nicéville - female, Southern Chin Hills, Myanmar; (h) *G. farinosa chitralensis* Moore - male, Chitral; (i) *G. f. chitralensis* Moore - female, Chitral.

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Table 1. description and distribution of *Gonepteryx* subspecies in the Indian region

Subspecies	Key to identification	Known distribution in the Indian region
<i>G. rhamni nepalensis</i> Image 3 a-b	Male wingspan: 60mm. Female wingspan: 70mm. Hind wing outer margin not dentate or slightly dentate between veins 1b and 4. Small toothed projection at v4. Male, upper side of hind and fore wing uniformly coloured sulphur-yellow. Fore wing upper side with orange yellow discocellular spots, larger than <i>mahaguru</i> and <i>rhamni</i> . Female, above creamy-white, below greenish-white.	Northern Pakistan; Nepal; northern Myanmar; India: Kashmir east to Uttarakhand, Sikkim, northeastern Himalaya.
<i>G. rhamni burmensis</i> Image 3 c	Wingspan: as above. Male, like <i>nepalensis</i> , but upperside of forewing deeper yellow. Forewing more deeply excavated below apex.	Southern Shan States, southern Myanmar
<i>G. rhamni gilgitica</i>	Wingspan: as above. Male, like <i>nepalensis</i> . Female, upperside of fore wing at base of costa and apex forewing tinged with yellow. Upperside of hind wing with inner area and outer margin to v4 tinged with yellow.	Pakistan: Gilgit, Astor and Chilas
<i>G. mahaguru mahaguru</i> Image 3 d-e	Male wingspan: 50mm, Female wingspan: 55mm. Hind wing outer margin dentate between veins 1b and 4 showing as a crinkled termen in both sexes. These appear as a series of small toothed projections, the largest of which is at v4. Fore wing apex produced in both sexes. Male, upper side of fore wing yellow and hind wing greenish-white. Both wings with small orange discocellular spots on upper side and small black discocellular spots on under side. Female, fore and hind wing creamy-white on upperside with small pale orange discocellular spots. Underside of both sexes, creamy-white with a greenish-tinge. Female slightly yellowish. Underside of hind wings of both sexes with a series of post discal black specks.	India: Kashmir east to Uttarakhand; Nepal.
<i>G. mahaguru zanekoides</i> Image 3 f-g	Male, female wingspan: 53mm. Differs from the nominotypical race as under: Fore wing broader, apex not so produced, costa more straight. Hind wing broader. Male, upper side pale yellowish-white. Female, whiter. Wing margins of both sexes flecked with black spots along costa and termen.	Upper Myanmar, western Myanmar, Chin Hills
<i>G. farinosa chitralensis</i> Image 3 h-i	Male wingspan: 55mm, female wingspan 60mm. Hind wing not crinkled at termen. Prominent tooth at v4. Male, fore wing upper side basal half yellow, distal half and hind wing whitish-yellow. Upper side of both wings with obscure, small pale orange discocellular spots. Female, chalky white above, obscure discocellular spots on upperside of fore wing and hind wing. Under side of both sexes yellowish-white. Posterior part of under side of fore wing in both sexes, distinctly paler. Discocellular spots on fore wing and hind wing more prominent than upper side. Series of black specks on fore wing beginning from mid costa to apex in both sexes.	Pakistan: Chitral
<i>G. amintha thibetana</i> Image 2 a-d	Male wingspan: 67mm. Female wingspan 69mm. Hind wing with outer margin crinkled at termen, more rounded and wavy than <i>mahaguru</i> . Toothed projection at v4, very small when compared to <i>rhamni</i> or <i>mahaguru</i> . Male, upper side of fore wing bright orange-yellow becoming lighter along the costa, termen and dorsum. A small orange discocellular spot. Upper side of hind wing, uniform yellow with a large orange discocellular spot, much larger than in <i>rhamni</i> . Underside of fore and hind wing is greenish-white with large brown discocellular spots; that on fore wing being small, and on hind wing, large. Female, greenish-white above and below with wing shape and discocellular spots as in male.	Southeastern Tibet; India: western and northern Arunachal Pradesh.

Note: Description and wingspans based on Nekrutenko (1973), Talbot (1939) and the authors' observations of specimens in the Natural History Museum, London.

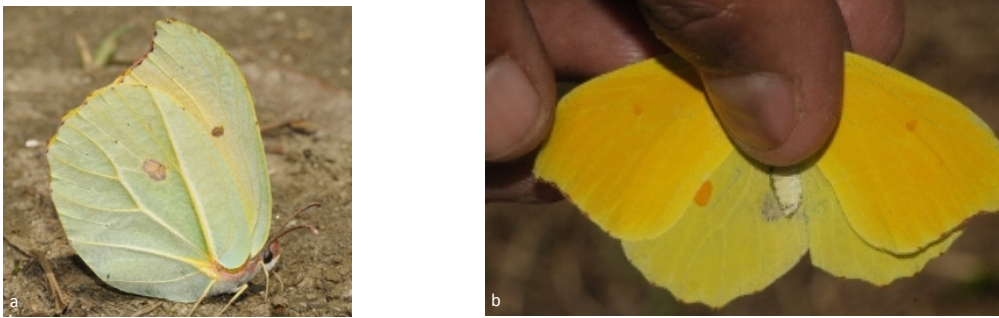
G. amintha thibetana Nekrutenko, 1968 whose holotype was collected by Ludlow at Lalung (Lhalung 28°38'3"N&94°4'23"E), Pachakshiri, 2100m, southeastern Tibet, 06 May 1938 is currently not reported from India (de Nicéville 1898; Bingham 1907; Evans 1932; Talbot 1939; Wynter Blyth 1957; Haribal 1992; Kehimkar 2008). However, Pachakshiri is nowadays known as Mechuka and is a region located on the upper tributaries of the Siyom River, West Siang District, Arunachal Pradesh, India. Sightings of *G. amintha thibetana* in India are mapped out (Image 1), showing the wide range of the sightings in Lalung, Anini and Eaglenest.

Further confirmation can be also taken from Ludlow's own journey description given in 'Takpo and Kongbo, S.E. Tibet' F. Ludlow (1940). Hence, the holotype of *G. amintha thibetana*, itself was collected from India; hence its exclusion from Indian fauna is an error of omission. The sightings from Anini and Eaglenest are new spot

records of this subspecies, eastwards and westwards of its current known distribution in India and southeastern Tibet.

In addition, there are no records of *G. amintha thibetana* from Bhutan (Poel & Wangchuk 2007), Nepal (Smith 1994) and Myanmar (Kinyon 2004). A review of existing literature reveal that six specimens of *G. amintha* were collected by Bailey in an expedition in 1913 in the Lower Tsang Po and Po Chu Valley between 1,560 and 2,187 m in June and July (Evans 1913). Both these locations are in southeastern Tibet, and it is likely that these are the subspecies *G. amintha thibetana*. Hence, prior to the records in this paper, *G. amintha thibetana* has been recorded only from southeastern Tibet, in our neighbouring regions, other than its original description from Lhalung, Pachakshiri.

It should be noted that there are no records of any *Gonepteryx* species from Arunachal Pradesh in previous



a–b - *Gonepteryx amintha thibetana*, 20 April 2012, Ramaling, Eaglenest WLS, West Kameng, Arunachal Pradesh. (a - male UN; b - male UP)



c–f - *Gonepteryx rhamni nepalensis*, 24 May 2012, Binsar WLS, Kumaon, Uttarakhand. (c - male UN; d - male UP; e - female UN; f - female UP)



g–h - *Gonepteryx rhamni nepalensis*, 27 August 2012, Jardhargaon, Tehri Garhwal, Uttarakhand. (g - female UN; h - female UP) i–j - *Gonepteryx mahaguru mahaguru*, 23 March 2012, Deoriya Tal, Rudraprayag, Uttarakhand. (i - male UN; j - male UP)

Image 4. Live individuals of *Gonepteryx amintha thibetana*, *Gonepteryx rhamni nepalensis* and *Gonepteryx mahaguru mahaguru*.
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surveys (Evans 1914; Betts 1950) and more recent ones such as Athreya (2006) from Eaglenest, Borang (2008) from Dihang Dibang Biosphere Reserve and Gogoi (2012) from the Mishmi Hills. The sighting of *G. amintha thibetana* from Anini, Dibang Valley, too, seems to be the only record of *Gonepteryx* species from that area.

We had only three sightings of the butterfly in April 2012 and no sightings in the months of March, May, September and October at Eaglenest Wildlife Sanctuary. This seems to imply that it is either uncommon and local or simply overlooked. In addition, a review of literature reveals that the previous sightings of *G. amintha* are in the months of April, May, June and July. With the later months of June and July coinciding with monsoons, it is likely that few surveys have been conducted in these months, accounting for the absence of records. Further surveys are necessary to establish whether the spot records in this paper represent a permanent range extension of this species, and whether its presence has simply been overlooked or whether these records are just sightings of vagrants.

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