



ISSN 0974-7907 (Online)  
ISSN 0974-7893 (Print)

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The genus *Calinaga* Moore, 1857 consists of 11 species (Beccaloni et al. 2003; Savela 2015) worldwide of which four have been recorded in India, with their diagnostic features, distributions and status as follows:

**(1) *Calinaga buddha* Moore, 1857:** The upperside is dark brown with creamy-white markings. The underside is pale ochreous, markings are as above. Wings are largely rounded, but the forewings are slightly produced. Only the first and parts of the second thoracic segment are dorso-laterally orange-red (Image 1; Moore 1857; Moore 1901; Evans 1932). The historically known range is from Murree in Pakistan to Kumaon in Uttarakhand, India (Evans 1932). A few records exist from Dalhousie, Chamba and Kulu in Himachal Pradesh from the 19<sup>th</sup> century at altitudes between 1,078m and 1,848m with records in March, May and July (Moore 1901). The last known specimens were collected from Mussoorie, Uttarakhand, in 1904 by Mackinnon and from Murree in 1910 (Roonwal 1963). There are no recent published records of this species.

**(2) *Calinaga gautama* Moore, 1902:** The markings are similar to *C. buddha*, but the ground colour is darker brown, especially on the underside. The forewings are considerably elongated and more produced, and the hindwings are narrower and more angular compared

## RE-DISCOVERY OF *CALINAGA ABORICA* TYTLER, 1915 (LEPIDOPTERA: NYMPHALIDAE: CALINAGINAE) FROM ARUNACHAL PRADESH, INDIA

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to *C. buddha*. The thorax is orange-red as in *C. buddha* (Image 1; Moore 1902; Evans 1932). It was historically known from the Sikkim-Darjeeling area (Image 1; Evans 1932). There have been more recent sightings in March–April 2014 and 2015 from Sikkim and from the border of Bhutan and northern Paschimbanga (=West Bengal), with several photographic records from Sikkim by Paresh

DOI: <http://dx.doi.org/10.11609/jott.2354.8.3.8618-8622> | ZooBank: urn:lsid:zoobank.org:pub:C377F907-9CAE-4508-AB0D-EA1986A45A03

Editor: Anonymity requested.

Date of publication: 26 March 2016 (online & print)

Manuscript details: Ms # 2354 | Received 08 October 2015 | Final received 07 January 2016 | Finally accepted 03 March 2016

Citation: Sondhi, S., T. Karmakar, Y. Sondhi, R. Jhaveri & K. Kunte (2016). Re-discovery of *Calinaga aborica* Tytler, 1915 (Lepidoptera: Nymphalidae: Calinaginae) from Arunachal Pradesh, India. *Journal of Threatened Taxa* 8(3): 8618–8622; <http://dx.doi.org/10.11609/jott.2354.8.3.8618-8622>

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Funding: Funding for this project was provided by the Rufford Small Grants programme to SS ([http://www.rufford.org/projects/sanjay\\_sondhi](http://www.rufford.org/projects/sanjay_sondhi)), and a Ramanujan Fellowship (Dept. of Science and Technology, Govt. of India) and research grant from NCBS to KK.

Conflict of Interest: The authors declare no competing interests.

Acknowledgments: The authors are grateful to Tana Tapi, DFO, Pakke Tiger Reserve for his ongoing support for the Lepidoptera surveys. Thanks are also due to the forest staff at Pakke Kesang, who accompanied us on the field surveys. Research and collection permits for this work were granted by the Principal Chief Wildlife Warden (Wildlife), Department of Environment and Forests, Arunachal Pradesh (permit letter no. CWL/G/13 (17)/06-07/12-14, dated 6 January 2010, to Ramana Athreya, and permit letter no. CWL/G/13(95)/2011-12/Pt.III/2466-70, dated 16 February 2015, to Krushnamegh Kunte). Images used in Image 1 were taken and reproduced with permission from the Natural History Museum, London, with support from David Lees and Geoff Martin.





*Calinaga buddha* Moore, 1857 (♂. "W. Himalayas", N. India. Date and collector unknown. BMNH(E)#984964)



*Calinaga gautama* Moore, 1902 (♂. Darjeeling, NE India. Date unknown. Coll: Lidderdale. BMNH(E)#1034807)



*Calinaga aborica* Tytler, 1915 (♂ lectotype. Abor Hills, NE India. 1913/06. Coll: H. C. Tytler. BMNH(E)#665228)



*Calinaga brahma* Butler, 1885 (♂. Jakama, Naga Hills, NE India. 1914/05. Coll: H. C. Tytler. BMNH(E)#985260)

**Image 1.** The four species of Indian *Calinaga*. A millimeter scale is at the bottom of each image. Images: Gaurav Agavekar and Krushnamegh Kunte. Copyright: Natural History Museum, London.

Churi, Swapnil Lokhande and Abhay Soman, and from the Buxa Tiger Reserve by Atanu Bose, Kurban Khan, Subhajit Mazumder and Tamaghna Sengupta (<http://www.ifoundbutterflies.org/sp/2823/Calinaga-gautama>).

**(3) *Calinaga aborica* Tytler, 1915:** Both the wing surfaces are black or very dark brown, with markings much reduced. The wings are rounded, the forewings are short and not produced. The thorax is orange-red only



Image 2. *Calinaga aborica* recorded near Sochung, Pakke Kesang, East Kameng District, Arunachal Pradesh, India. 21 May 2015. A millimeter scale is at the bottom of C–D.

A–B: Sanjay Sondhi; C–D: Yash Sondhi, copyright National Centre for Biological Sciences, Bengaluru.

laterally, not dorsally (Image 1; Tytler 1915a; Evans 1932). It is historically known from the Abor Valley, Arunachal Pradesh, India, and from the Sengkor Valley, northern Myanmar (Tytler 1915a,b; Evans 1932; Kinyon 2004). There are no recent published records. An unpublished name, *Calinaga aborica naima* Vane-Wright, has been mentioned in the past (d’Abrera 1985; Kinyon 2004). *Calinaga aborica naima* and the taxon that it represents will be treated in a separate publication (Vane-Wright, pers. comm. December 2015).

**(4) *Calinaga brahma* Butler, 1885:** The wings are dark brown, the markings are very small with many discal markings reduced to dots. The forewings are elongated and produced, the hindwings are not very angular. The entire dorso-lateral surface of the thorax is orange-red (Image 1; Butler 1885; Evans 1932). It was historically known from “Near Assam” (Butler 1885), “Assam–N. Burma” (Evans 1932; Roonwal et al. 1963), and from Yunnan, China, and Taiwan (=Formosa) (Savela 2015). There are dozens of recent sightings, with photographic records in March 2009 from the Namdapha National

Park in eastern Arunachal Pradesh, and in May 2012 from Nagaland, northeastern India (<http://www.ifoundbutterflies.org/sp/1134/Calinaga-brahma>). The historical records from Assam are erroneous in the modern context: during the time of the old records of the British Raj, Assam included all of northeastern India. All the historical as well as the recent records of this species are from Nagaland and eastern Arunachal Pradesh, adjoining currently politically delineated Assam where suitable habitat of *C. brahma* may be absent.

Thus, these four species occur allopatrically in the western Himalaya (*buddha*), eastern Himalaya (Sikkim-Bhutan-Paschimbanga, *gautama*), eastern Himalaya (Arunachal Pradesh and northern Myanmar, *aborica*), and northeastern India to northern Myanmar (*brahma*). They have distinct coloration and markings, and characteristically different wing shapes (Image 1). In the past, *gautama*, *aborica*, *brahma* and some Indo-Chinese taxa have been treated as subspecies of *buddha* (Evans 1932; Ek-Amnuay 2012). Although *brahma* is still sometimes treated as a subspecies of *buddha*, *gautama*

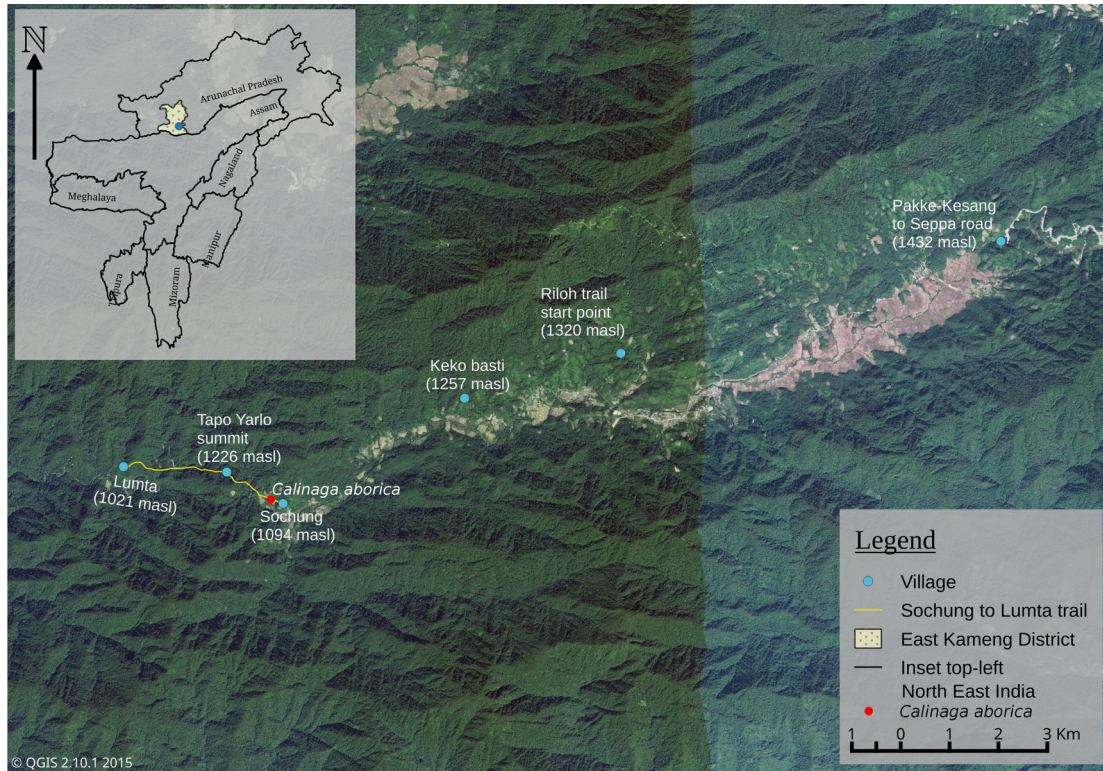


Image 3. Map showing locality where *Calinaga aborica* was sighted at Pakke Kesang on 21 May 2015.

and *aborica* are increasingly treated as distinct species (d'Abrera 1985; Kinyon 2004).

Sanjay Sondhi has been surveying the Lepidoptera of the Kameng Protected Area Complex that includes the Eaglenest Wildlife Sanctuary and Sessa Orchid Wildlife Sanctuary in the West Kameng District, and the Pakke Tiger Reserve in the East Kameng District since 2009. The butterflies of Pakke Kesang, on the northeastern boundary of the Pakke Tiger Reserve, had not been properly surveyed before, so we surveyed this area in September 2013 (SS) and from May to July 2015 (all authors).

On 21 May 2015 at 11:49hr, a single male *Calinaga aborica* was observed near Pakke Kesang by the Sochung River on a trail from Sochung Village (27°08.510'N & 93°08.644'E) to Tapo Yarlo and Lumta Village at an altitude of approximately 1,100m, in East Kameng District of Arunachal Pradesh (Image 3). The individual was feeding on a carnivore scat, and was easily approached without being disturbed. After a few minutes it flew and settled on a nearby bush, where it was netted (Image 2; <http://www.ifoundbutterflies.org/sp/2989/Calinaga-aborica>).

The only specimen of *Calinaga aborica* that we encountered was first photographed in the field and

then collected with a butterfly net for further taxonomic and phylogenetic studies. It was identified by comparing the original species description and illustration (Tytler 1915a,b), and by comparing it with the male lectotype that KK had inspected at the Natural History Museum, London, along with other museum material (Image 1). It was pinned after preserving a tissue sample in pure ethanol for molecular sequencing. This specimen (specimen code NCBS-AJ602; Image 2) is deposited in the collections facility at the National Centre for Biological Sciences, Bengaluru.

*Calinaga aborica* was described by Tytler (1915a,b) as part of his series of papers on butterflies from Manipur and the Naga Hills. His description of the species was based on two males provided to him by Captain Porter. These specimens were collected in June and July on the Dihang River in the Abor Hills. While the description of the species was provided in Tytler (1915a), the Plate III illustrating the species appeared in Tytler (1915b), on account of a delay because of the ongoing war. The Abor Hills are bound by the Mishmi Hills to the east and the Miri Hills to the west, and fall in the Upper Siang, East Siang and West Siang districts of Arunachal Pradesh. The Dihang River, also called the Siang River, which eventually flows into the Brahmaputra River, drains

these districts. The precise location at which Captain Porter collected these individuals is not known but the current location at Sochung is at least 200km west of the Dihang River.

A review of literature on butterflies of Arunachal Pradesh (Evans 1914; Betts 1950; Gupta & Shukla 1988; Athreya 2006; Borang et al. 2008; Gogoi 2012) showed that there are no records of this species from India since its original description in 1915. Specifically, butterfly studies by Borang et al. (2008) in the Dihang Dibang Biosphere Reserve, which includes the type locality of this species, and Gogoi (2012) in the Mishmi Hills to the east did not list this species. Hence, this record represents the first sighting of *C. aborica* in India since its original description in 1915, and a re-discovery of the species. Subsequent records, if any, of this and other Indian *Calinaga* species will be available on the Butterflies of India website (Kunte et al. 2016).

## References

- Athreya, R. (2006).** Eagenest Biodiversity Project (2003–2006). Conservation Resources for Eagenest Wildlife Sanctuary. Kaati Trust, Pune.
- Beccaloni, G., M. Scoble, I. Kitching, T. Simonsen, G. Robinson, B. Pitkin, A. Hine & C. Lyal (eds.). (2003).** *The Global Lepidoptera Names Index (LepIndex)*. World Wide Web electronic publication. <http://www.nhm.ac.uk/entomology/lepindex> [accessed 20 August 2015]
- Betts, F.N. (1950).** On a collection of butterflies from the Balipara Frontier Tract and the Subansiri area (northern Assam). *Journal of the Bombay Natural History Society* 49(3): 488–502.
- Borang, A., B.B. Bhatt, M. Tamuk, A. Borkotoki & J. Kalita (2008).** Butterflies of Dihang Dibang Biosphere Reserve of Arunachal Pradesh, Eastern Himalayas, India. *Bulletin of Arunachal Forest Research* 24(1&2): 41–53.
- Butler, A.G. (1885).** On a Collection of Lepidoptera made at Manipur and on the Borders of Assam by Dr. George Watt. *Annals and Magazine of Natural History including Zoology, Botany and Geology* XVII(Fifth series): 298–310+8pls.
- d'Abrera, B. (1985).** *Butterflies of the Oriental Region. Part II: Nymphalidae, Satyridae & Amathusidae*. Hill House, Melbourne, Australia, 534pp.
- Ek-Amnuay, P. (2012).** *Butterflies of Thailand. 2<sup>nd</sup> Edition*. Baan Lae Suan (=Amarin) Printing & Publishing Co., Bangkok.
- Evans W.H. (1914).** A list of butterflies caught by Capt. F.M. Bailey in S. East Tibet during 1913. *Journal of the Bombay Natural History Society* 23: 532–546.
- Evans, W.H. (1932).** *The Identification of Indian Butterflies - 2<sup>nd</sup> Revised Edition*. Bombay Natural History Society, Bombay, x+454pp+32pl.
- Gogoi, M.J. (2012).** Butterflies (Lepidoptera) of Dibang Valley, Mishmi Hills, Arunachal Pradesh, India. *Journal of Threatened Taxa* 4(12): 3137–3160; <http://dx.doi.org/10.11609/JoTT.o2975.3137-60>
- Gupta, I.J. & J.P.N. Shukla (1988).** Butterflies of Arunachal Pradesh and adjoining Areas, India (Lepidoptera: Acraeidae, Satyridae, Nymphalidae, Riodinidae and Lycaenidae). *Records of Zoological Survey of India, Occasional Paper*. No. 109: 115pp., IXXII, 1 map.
- Horsfield, T. & F. Moore (1857).** A Catalogue of the Lepidopterous Insects in the Museum of the Hon. East-India Company Vol. 1. W M H Allen & Co, London, 278pp. Pl. 1-12,1a,2a,3a,4a,5a,6a.
- Kinyon, S. (2004).** *Illustrated Checklist for the Butterflies of Myanmar*. Smithsonian Institution, 197pp.
- Kunte, K., P. Roy, S. Kalesh, & U. Kodandaramaiah (eds.) (2016).** Butterflies of India. v. 2.22. Indian Foundation for Butterflies. URL: <http://www.ifoundbutterflies.org/tx/104-Calinaga>. Accessed 20 March 2016.
- Moore, F. (1901–1903).** *Lepidoptera Indica. Rhopalocera Vol V. Family Nymphalidae. Sub-family Nymphalinae (continued), Groups Melitaeina and Eurytelina. Sub-families Acraeinae, Pseudergolinae, Calinaginae, and Libytheinae. Family Riodinidae. Sub-family Nemeobiinae. Family Papilionidae. Sub-families Parnassiinae, Thaidinae, Leptocircinae, and Papilionae*. Lovell Reeve & Co., London, 248pp.
- Roonwal, M.L., R.N. Mathur, G.D. Bhasin, P. N. Chatterjee, P.K. Sen-Sarma, B. Singh, A. Chandra, R. S. Thapa & K. Kumar (1963).** A systematic catalogue of the main identified entomological collection at the Forest Research Institute, Dehra Dun, Indian Forest Leaflet, 121(4) Ent., Part 31 (Lepidoptera): 1295–1395.
- Savela, M. (2015).** Lepidoptera and some other life forms. <http://www.nic.funet.fi/pub/sci/bio/life/warp/lepidoptera-list.html#lepidoptera> (accessed 20 August 2015).
- Tytler, H.C. (1915a).** Notes on some new and interesting butterflies from Manipur and the Naga Hills. Part - II. *Journal of the Bombay Natural History Society* 23: 502–515+4pls (505).
- Tytler, H.C. (1915b).** Notes on some new and interesting butterflies from Manipur and the Naga Hills. Part - III. *Journal of the Bombay Natural History Society* 24: 119–155 (135).

