



Open Access

10.11609/jott.2026.18.7.29159-29374
www.threatenedtaxa.org

26 July 2026 (Online & Print)
18(7): 29159-29374
ISSN 0974-7907 (Online)
ISSN 0974-7893 (Print)



Vachellia nilotica



P Krítika



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

Publisher

Wildlife Information Liaison Development Society

www.wild.zooreach.org

Host

Zoo Outreach Organization

www.zooreach.org

Srivari Illam, No. 61, Karthik Nagar, 10th Street, Saravanampatti, Coimbatore, Tamil Nadu 641035, India

Registered Office: 3A2 Varadarajulu Nagar, FCI Road, Ganapathy, Coimbatore, Tamil Nadu 641006, India

Ph: +91 9385339863 | www.threatenedtaxa.org

Email: sanjay@threatenedtaxa.org

EDITORS

Founder & Chief Editor

Dr. Sanjay Molur

Wildlife Information Liaison Development (WILD) Society & Zoo Outreach Organization (ZOO), Coimbatore, Tamil Nadu 641006, India

Assistant Editor

Dr. Chaithra Shree J., WILD/ZOO, Coimbatore, Tamil Nadu 641006, India

Managing Editor

Mr. B. Ravichandran, WILD/ZOO, Coimbatore, Tamil Nadu 641006, India

Associate Editors

Dr. Mandar Paingankar, Government Science College Gadchiroli, Maharashtra 442605, India

Dr. Ulrike Streicher, Wildlife Veterinarian, Eugene, Oregon, USA

Ms. Priyanka Iyer, ZOO/WILD, Coimbatore, Tamil Nadu 641006, India

Board of Editors

Dr. Russel Mittermeier

Executive Vice Chair, Conservation International, Arlington, Virginia 22202, USA

Prof. Mewa Singh Ph.D., FASc, FNA, FNAsc, FNAPsy

Ramanna Fellow and Life-Long Distinguished Professor, Biopsychology Laboratory, and Institute of Excellence, University of Mysore, Mysuru, Karnataka 570006, India; Honorary Professor, Jawaharlal Nehru Centre for Advanced Scientific Research, Bangalore; and Adjunct Professor, National Institute of Advanced Studies, Bangalore

Stephen D. Nash

Scientific Illustrator, Conservation International, Dept. of Anatomical Sciences, Health Sciences Center, T-8, Room 045, Stony Brook University, Stony Brook, NY 11794-8081, USA

Dr. Fred Pluthero

Toronto, Canada

Dr. Priya Davidar

Sigur Nature Trust, Chadapatti, Mavinhalla PO, Nilgiris, Tamil Nadu 643223, India

Dr. John Fellowes

Honorary Assistant Professor, The Kadoorie Institute, 8/F, T.T. Tsui Building, The University of Hong Kong, Pokfulam Road, Hong Kong

Prof. Dr. Mirco Solé

Universidade Estadual de Santa Cruz, Departamento de Ciências Biológicas, Vice-coordenador do Programa de Pós-Graduação em Zoologia, Rodovia Ilhéus/Itabuna, Km 16 (45662-000) Salobrinho, Ilhéus - Bahia - Brasil

Dr. Rajeev Raghavan

Professor of Taxonomy, Kerala University of Fisheries & Ocean Studies, Kochi, Kerala, India

English Editors

Mrs. Mira Bhojwani, Pune, India

Dr. Fred Pluthero, Toronto, Canada

Copy Editors

Ms. Paloma Noronha, Daman & Diu, India

Ms. Priyanka Iyer, Zooreach, Coimbatore, India

Ms. Trisha Bhattacharjee, Zooreach, Coimbatore, India

Ms. Usha Ravindra, Zooreach, Coimbatore, India

Mr. S. Sushanth, Zooreach, Coimbatore, India

Web Development

Mrs. Latha G. Ravikumar, ZOO/WILD, Coimbatore, India

Typesetting

Mrs. Radhika, Zooreach, Coimbatore, India

Mrs. Geetha, Zooreach, Coimbatore, India

Fundraising/Communications

Mrs. Payal B. Molur, Coimbatore, India

Subject Editors 2021–2023

Fungi

Dr. B. Shivaraju, Bengaluru, Karnataka, India

Dr. R.K. Verma, Tropical Forest Research Institute, Jabalpur, India

Dr. Vatsavaya S. Raju, Kakatiya University, Warangal, Andhra Pradesh, India

Dr. M. Krishnappa, Jnana Sahyadri, Kuvempu University, Shimoga, Karnataka, India

Dr. K.R. Sridhar, Mangalore University, Mangalagangothri, Mangalore, Karnataka, India

Dr. Gunjan Biswas, Vidyasagar University, Midnapore, West Bengal, India

Dr. Kiran Ramchandra Ranadive, Annasaheb Magar Mahavidyalaya, Maharashtra, India

Plants

Dr. G.P. Sinha, Botanical Survey of India, Allahabad, India

Dr. N.P. Balakrishnan, Ret. Joint Director, BSI, Coimbatore, India

Dr. Shonil Bhagwat, Open University and University of Oxford, UK

Prof. D.J. Bhat, Retd. Professor, Goa University, Goa, India

Dr. Ferdinando Boero, Università del Salento, Lecce, Italy

Dr. Dale R. Calder, Royal Ontario Museum, Toronto, Ontario, Canada

Dr. Cleofas Cervancia, Univ. of Philippines Los Baños College Laguna, Philippines

Dr. F.B. Vincent Florens, University of Mauritius, Mauritius

Dr. Merlin Franco, Curtin University, Malaysia

Dr. V. Irudayaraj, St. Xavier's College, Palayamkottai, Tamil Nadu, India

Dr. B.S. Kholia, Botanical Survey of India, Gangtok, Sikkim, India

Dr. Pankaj Kumar, Department of Plant and Soil Science, Texas Tech University, Lubbock, Texas, USA.

Dr. V. Sampath Kumar, Botanical Survey of India, Howrah, West Bengal, India

Dr. A.J. Solomon Raju, Andhra University, Visakhapatnam, India

Dr. Vijayasankar Raman, University of Mississippi, USA

Dr. B. Ravi Prasad Rao, Sri Krishnadevaraya University, Anantpur, India

Dr. K. Ravikumar, FRLHT, Bengaluru, Karnataka, India

Dr. Aparna Watve, Pune, Maharashtra, India

Dr. Qiang Liu, Xishuangbanna Tropical Botanical Garden, Yunnan, China

Dr. Noor Azhar Mohamed Shazili, Universiti Malaysia Terengganu, Kuala Terengganu, Malaysia

Dr. M.K. Vasudeva Rao, Shiv Ranjani Housing Society, Pune, Maharashtra, India

Prof. A.J. Solomon Raju, Andhra University, Visakhapatnam, India

Dr. Mandar Datar, Agharkar Research Institute, Pune, Maharashtra, India

Dr. M.K. Janarthanam, Goa University, Goa, India

Dr. K. Karthigeyan, Botanical Survey of India, India

Dr. Errol Vela, University of Montpellier, Montpellier, France

Dr. P. Lakshminarasimhan, Botanical Survey of India, Howrah, India

Dr. Larry R. Noblick, Montgomery Botanical Center, Miami, USA

Dr. K. Haridasan, Pallavur, Palakkad District, Kerala, India

Dr. Analinda Manila-Fajard, University of the Philippines Los Baños, Laguna, Philippines

Dr. P.A. Sinu, Central University of Kerala, Kasaragod, Kerala, India

Dr. Afroz Alam, Banasthali Vidyapith (accredited A grade by NAAC), Rajasthan, India

Dr. K.P. Rajesh, Zamorin's Guruvayurappan College, GA College PO, Kozhikode, Kerala, India

Dr. David E. Boufford, Harvard University Herbaria, Cambridge, MA 02138-2020, USA

Dr. Ritesh Kumar Choudhary, Agharkar Research Institute, Pune, Maharashtra, India

Dr. A.G. Pandurangan, Thiruvananthapuram, Kerala, India

Dr. Navendu Page, Wildlife Institute of India, Chandrabani, Dehradun, Uttarakhand, India

Dr. Kannan C.S. Warriar, Institute of Forest Genetics and Tree Breeding, Tamil Nadu, India

Invertebrates

Dr. R.K. Avasthi, Rohtak University, Haryana, India

Dr. D.B. Bastawade, Maharashtra, India

Dr. Partha Pratim Bhattacharjee, Tripura University, Suryamaninagar, India

Dr. Kailash Chandra, Zoological Survey of India, Jabalpur, Madhya Pradesh, India

Dr. Ansie Dippenaar-Schoeman, University of Pretoria, Queenswood, South Africa

Dr. Rory Dow, National Museum of Natural History Naturalis, The Netherlands

Dr. Brian Fisher, California Academy of Sciences, USA

Dr. Richard Gallon, Llandudno, North Wales, LL30 1UP

Dr. Hemant V. Ghate, Modern College, Pune, India

Dr. M. Monwar Hossain, Jahangirnagar University, Dhaka, Bangladesh

For Focus, Scope, Aims, and Policies, visit https://threatenedtaxa.org/index.php/JoTT/aims_scope

For Article Submission Guidelines, visit <https://threatenedtaxa.org/index.php/JoTT/about/submissions>

For Policies against Scientific Misconduct, visit https://threatenedtaxa.org/index.php/JoTT/policies_various

continued on the back inside cover

Cover: Parts of *Vachellia nilotica*, medium - watercolours. © P Kritika



An updated checklist and new records of butterfly species in Kedarnath Musk Deer Sanctuary (western Himalaya), Uttarakhand, India

Anand Kumar¹ , Priyanshu Kumar² , Gourav Lochan³ , Prachi Arya⁴ & Rajeev Lochan⁵

^{1–4} Department of Zoology, HNB Garhwal University Srinagar Garhwal, Uttarakhand 246174, India.

⁵ Department of Zoology, HNB Garhwal University SRT Campus Badshahithaul Tehri Garhwal, Uttarakhand 246174, India.

¹ akumar.ags@gmail.com, ² priyanshuk.7055@gmail.com, ³ gouravlochan12@gmail.com, ⁴ aryaprachi7055@gmail.com,

⁵ rajeevlochan88@gmail.com (corresponding author)

Abstract: This study presents an updated checklist of butterflies of Kedarnath Musk Deer Sanctuary (KMDS), located in the Garhwal Himalaya of Uttarakhand, India, based on systematic field surveys conducted across multiple elevations and habitats. A total of 300 butterfly species belonging to six families and 19 subfamilies were recorded from the Sanctuary. The present work documents 153 species newly recorded from KMDS, substantially expanding the previously known butterfly fauna of the area. Species records were verified through photographic documentation and standard taxonomic literature, and only diagnostically confirmed records were included in the checklist. The updated inventory highlights the sanctuary as an important repository of butterfly diversity in the western Himalaya and provides a reliable baseline for future faunistic, taxonomic, and biodiversity assessments.

Keywords: Butterfly diversity, distribution extension, elevational gradient, insect conservation, insect fauna, Lepidoptera, new records, Papilionoidea, photographic documentation, Protected area.

सारांश: यह अध्ययन उत्तराखण्ड के गढ़वाल हिमालय में स्थित केदारनाथ कस्तूरी मृग अभयारण्य (KMDS) की तितलियों की एक अद्यतन सूची प्रस्तुत करता है, जो विभिन्न ऊँचाई वाले क्षेत्रों एवं आवासों में किए गए व्यवस्थित क्षेत्रीय सर्वेक्षणों पर आधारित है। इस अध्ययन में अभयारण्य से छह कुलों (Families) एवं 19 उपकुलों (Subfamilies) से संबंधित कुल 300 तितली प्रजातियाँ अभिलिखित की गईं। इनमें से 153 प्रजातियाँ पहली बार केदारनाथ कस्तूरी मृग अभयारण्य से दर्ज की गई हैं, जिससे इस क्षेत्र की पूर्व ज्ञात तितली विविधता में उल्लेखनीय वृद्धि हुई है। सभी प्रजातियों की पहचान फोटोग्राफिक अभिलेखों तथा मानक वर्गिकी साहित्य के आधार पर सत्यापित की गई तथा केवल पुष्ट पहचान वाली प्रजातियों को ही सूची में सम्मिलित किया गया। यह अद्यतन सूची अभयारण्य को पश्चिमी हिमालय में तितली विविधता के एक महत्वपूर्ण केंद्र के रूप में स्थापित करती है तथा भविष्य में जीवसूची (faunistic), वर्गिकी (taxonomic) एवं जैव विविधता संबंधी अध्ययनों के लिए एक विश्वसनीय आधारभूत संदर्भ प्रदान करती है।

Editor: Mitrajit Deb, Assam University, Silchar, India.

Date of publication: 26 July 2026 (online & print)

Citation: Kumar, A., P. Kumar, G. Lochan, P. Arya & R. Lochan (2026). An updated checklist and new records of butterfly species in Kedarnath Musk Deer Sanctuary (western Himalaya), Uttarakhand, India. *Journal of Threatened Taxa* 18(7): 29269–29286. <https://doi.org/10.11609/jott.10468.18.7.29269-29286>

Copyright: © Kumar et al. 2026. Creative Commons Attribution 4.0 International License. JoTT allows unrestricted use, reproduction, and distribution of this article in any medium by providing adequate credit to the author(s) and the source of publication.

Funding: There was no funding to carry out this research work.

Competing interests: The authors declare no competing interests.

Author details: DR. ANAND KUMAR is an assistant professor at the Department of Zoology, Hemvati Nandan Bahuguna Garhwal University (HNBGU). His research focuses on molecular ecology, habitat ecology, and the conservation of high-elevation fauna. He currently leads the Avifauna Himalaya Research Group. PRIYANSHU KUMAR is a member of the Avifauna Himalaya Research Group and his research interests include avian ecology, biodiversity conservation, wildlife ecology, and Himalayan ecosystems. PRACHI ARYA is a member of the Avifauna Himalaya Research Group and her research focuses on Himalayan biodiversity, wildlife ecology, and conservation biology. GOURAV LOCHAN is a PhD scholar at HNBGU. His research focuses on freshwater ecology and wetland birds, with particular emphasis on the ecology and conservation of the Brown Dipper and Himalayan freshwater ecosystems. RAJEEV LOCHAN research specializes in soundscape ecology, Himalayan Monal ecology, and the ecology and conservation of high-elevation fauna in the Himalayan region.

Author contributions: AK planned the work, designed the study. PK, GL, and PA conducted robust fieldwork in the Kedarnath Musk Deer Sanctuary. RL identifies the study and helps with the analysis and designing the graph.



INTRODUCTION

Butterfly diversity in the Himalayan region is strongly influenced by steep elevation gradients, rugged terrain, climatic heterogeneity, and habitat mosaics (Acharya & Vijayan 2015). These micro and macrohabitat components make it one of the most important regions for Lepidoptera diversity in India (Devi et al. 2023; Dewan et al. 2024). Variations in temperature, rainfall, and vegetation structure along elevation gradients play a key role in shaping species richness and distribution patterns, with many species showing narrow habitat and altitudinal preferences (Parmesan 2003; Hill et al. 2021). Uttarakhand, particularly the Garhwal Himalaya, supports high butterfly diversity, yet faunistic documentation remains uneven across protected areas (Sondhi & Kunte 2018). Kedarnath Musk Deer Sanctuary (KMDS) represents a large, ecologically diverse landscape within the western Himalaya, yet information on its butterfly fauna is limited and outdated (Singh 2009). This highlights the need for a focused, up-to-date checklist to accurately document butterfly diversity within the sanctuary.

Over 500 butterfly species have been documented in Uttarakhand (Sondhi & Kunte 2018), with around 407 reported specifically from the Garhwal region (Singh et al. 2016). This landscape provides nutrient-rich habitats that support the region's flourishing butterfly fauna. KMDS, an essential protected area in the Garhwal region of the western Himalaya, is renowned for its diverse habitats and rich biodiversity component. It is an important protected zone dedicated to the conservation of the endangered Musk Deer *Moschus chrysogaster* encompasses a diverse array of ecosystems, such as alpine meadows, temperate forests, and subalpine scrublands (Champion & Seth 1968), each creating distinct microhabitats that sustain a rich array of fauna, including numerous butterfly species. The region's moderate temperatures and well-distributed rainfall support an abundance of nectar-rich flowers and host plants, which are critical for butterfly survival and reproduction. During summer, the soil remains moist from melting snow, promoting the growth of algae, mosses, and lichens, which in turn support a thriving butterfly population. The forest floor, valley gorges, and tree canopies often showcase a vibrant kaleidoscope of butterflies (Lochan et al. 2022). Understanding the diversity of butterfly species is crucial for maintaining the health and balance of any ecosystem. This knowledge allows us to predict habitat preferences and comprehend their roles within trophic levels. Despite its

ecological significance, butterfly diversity in KMDS faces several threats, including habitat degradation and heavy tourism, which severely impact butterfly populations (Sharma et al. 2019; Lochan et al. 2022). Moreover, the use of pesticides and insecticides poses a direct threat to butterflies, disrupting their food chains and reproductive cycles (Ara & Haque 2021; Kubelková 2024; Wani & Shah 2024). An earlier study at KMDS recorded 147 butterfly species (Singh 2009). Considering the altitude-dependent variations in topography and the diverse habitats at different elevations, this number may be underestimated. Given this gap, a thorough investigation is essential to accurately determine the total number of butterfly species in the sanctuary. By synthesising existing knowledge and contributing new insights, this paper aims to foster a deeper understanding of the diversity of butterflies and their environment in KMDS.

Study area

The current study was conducted in the KMDS, located in the western Himalaya at an elevational range of 800–5,960 m, between 30.7352° N and 79.0662° E (Image 1). Spanning 975 km², this landscape falls under the western Himalayan region and is classified under IUCN Management Category IV (Managed Nature Reserve) in the Biogeographical Province 2.38.12. It is part of the western Himalaya Endemic Bird Area, recognised as an Important Bird Area (IBA Code IN-UT-07) (Stattersfield 1998; Vázquez 1998). The area generally consists of dense forests, largely dominated by *Quercus leucotrichophora*, *Q. semecarpifolia*, and *Rhododendron* spp. with a deep understory of *Rosa brunonii*, *Berberis asiatica*, and *Carissa carandas*. The diverse habitats and climatic conditions provide a suitable environment for a wide range of butterfly species. Around 29 study sites were selected across different parts of the sanctuary, followed by direct sampling (Table 1).

METHODS

Butterfly surveys were conducted over a period of three years, from March 2021–August 2024, across KMDS. The sanctuary was divided into equal-sized grid cells, from which 29 grids were selected to represent the full elevation range of the area (~800–5,960 m). Each selected grid was surveyed multiple times during favourable weather conditions during the peak butterfly activity period. Surveys were carried out using visual encounter and transect-based walks. Due to rugged terrain and variable habitat structure, variable-length

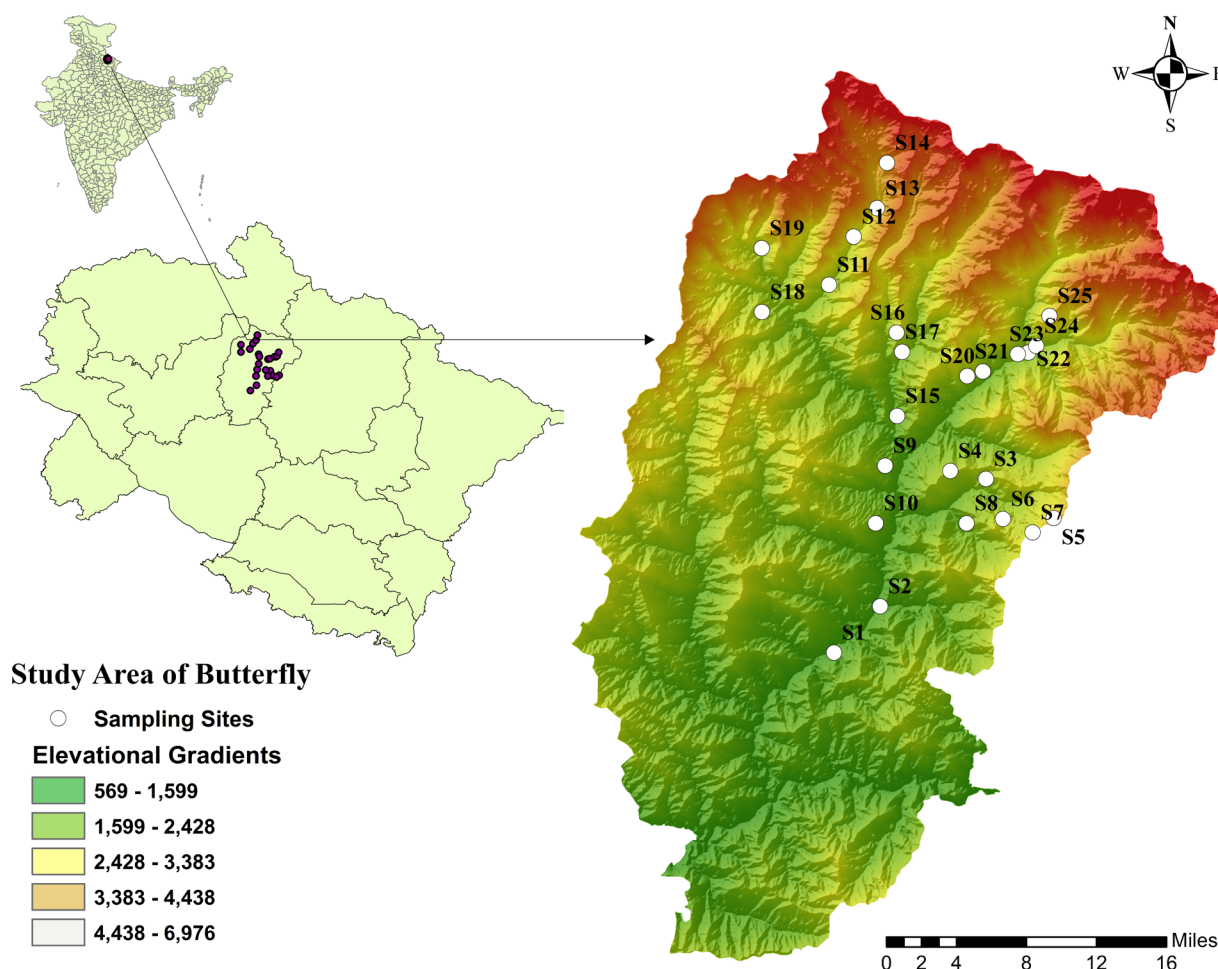


Image 1. Study area (Kedarnath Musk Deer Sanctuary) depicting the location of all sampling sites for the present study.

transects (0.5–2 km) were employed instead of fixed-width transects. Transects were walked across major habitat types, including forested areas, grasslands, meadows, and riverine zones, to maximise species detection across elevation gradients. In total, surveys comprised approximately 14 field days per month. All records were based on non-invasive photographic documentation; no specimens were collected. Butterflies were photographed using Nikon Coolpix P900, P610, and D7500 cameras, and locations were recorded using a Garmin eTrex 20 GPS unit. Species identification was performed using standard field guides and taxonomic literature (Kehimkar 2008, 2016; Sondhi & Kunte 2018). For rare or taxonomically challenging species, diagnostic morphological characters visible in photographs, particularly wing patterns and underside markings, were carefully compared with published descriptions and reference images. Only records supported by clear diagnostic photographic evidence were treated

as confirmed and included in the checklist; uncertain records were excluded from confirmed results.

RESULTS

Seventeen years since the last study in this landscape, comprehensive research on butterfly diversity was deemed necessary. The present survey indicates the number of butterfly species may have been underestimated in previous studies. Through detailed observations conducted over three consecutive years, around 300 butterfly species were recorded (Table 2, Image 2), compared with the previously documented 147 (Singh 2009). This update includes 153 additional species, some of which are either new to the region or exceedingly rare. Among the newly recorded species some of the rare butterflies are *Melanitis zitenius*, *Aeromachus stigmata*, *Hasora taminatus*, *Catapaecilma major*,

Miletus chinensis, *Belenois aurota*, *Hestina persimilis*, *Pelopidas conjuncta*, *Ionolyce helicon*, *Heliophorus oda*, *Heliophorus indicus* (Fruhstorfer), *Heliophorus epicles* (Godart), *Heliophorus brahma* (Moore), *Heliophorus moorei coruscans*, *Heliophorus moorei tytleri*, *Iraota timoleon* (Stoll), *Sinthusia chandrana*, *Tarucus venosus*, *Chliaria othona*, *Catochrysops panormus*, *Everes huegelii huegelii* (Gistel), *Spindasis vulcanus*, *Spindasis elima*, *Aricia agestis nazira*, *Neope pulaha*, *Melanitis phedima bela*.

Most significant records from the KMDS region

1. Great Evening Brown *Melanitis zitenius* Herbst, 1796. *M. zitenius*, with its known distribution extending eastwards from Kumaon to Sikkim, was previously reported in Uttarakhand by Uniyal et al. (2013). Subsequent literature has called for validation, given the absence of specimens or photographic evidence to support this claim (Singh et al. 2016). This species is legally protected in India under Schedule II of the Wildlife (Protection) Act, 1972. A photographic record of a single individual on 12 December 2016 at an elevation of approximately 1,680 m on a forest floor in the sanctuary marks the first confirmed photographic record for Uttarakhand and the first confirmed record from KMDS. To the best of current knowledge, this species has not been previously reported from KMDS (Singh 2009). This species is considered very rare in the state (Image 3).

2. Veined Scrub Hopper *Aeromachus stigmata*, a small butterfly, has been documented in Assam and Arunachal Pradesh in the northeastern Himalayas, with an altitude range of up to 1,700 m (Kehimkar 2016). According to the existing literature, there is no prior record of this species in the KMDS. On 12 August 2021, this species was observed near an oak forest with Lantana-dominated bushes close to a water stream at an elevation of 1,800 m. This marks yet another significant breakthrough in the sighting of this species within the KMDS (Image 3).

3. White-banded Awl *Hasora taminatus* Hübner, 1818. *H. taminatus*, recognised by the distinct white band on the underside of its hindwing, is typically observed at lower elevations, with a distribution documented across the Western Ghats, Eastern Ghats, and parts of the northeastern states (Kehimkar 2016). Previous literature does not mention its presence in the western Himalayan region. This record is the first for this part of the Himalaya and Uttarakhand, including KMDS. A solitary specimen was photographed on 05 October 2019, at an elevation of 1,560 m near an oak-pine mixed

forest (Image 3).

4. The Common Tinsel *Catapaecilma major*. *C. major*, is primarily found in the southeastern and northeastern regions of India, thriving in dense forests and open hilly jungles. It is quite rare in Uttarakhand, with just one photographic record from the Kumaon region (Kumar et al. 2019). There have been no prior records of this species in the Garhwal region (Singh et al. 2016). The first instance of *C. major* in Garhwal was documented on 23 July 2018, at an altitude of 870 m near Lantana shrubs. This represents the first confirmed record of this species in KMDS (Image 3).

5. Common Brownie *Miletus chinensis*. *M. chinensis*, a rare butterfly species previously unrecorded in the Garhwal Himalaya region (Singh et al. 2016), was observed on 08 August 2020, at an elevation of 2500 m in a habitat primarily dominated by Oak and interspersed with *Drepanostachyum* spp. This marks the first confirmed record of this species in the sanctuary (Image 3).

6. Pioneer *Belenois aurota*. *Belenois aurota* (Pioneer) is a widespread and highly migratory pierid butterfly commonly occurring in open habitats, forest edges, and valleys across the Himalaya. The species has been previously reported from several localities in Uttarakhand, including forest, Dehradun Valley & Shiwaliks; Shikhar Falls, Sahastradhara, Maldeota, Mussoorie, confirming its regional presence (Singh et al. 2016). The present observation from KMDS adds an important locality record within this high-altitude protected area.

7. Siren *Hestina persimilis* Westwood, 1851. Thriving in forested regions, this rare butterfly is usually observed in the Himalaya at elevations ranging 750–1,460 m, though it may occasionally ascend to higher altitudes. On 13 September 2021, this elusive species was documented at an elevation of 800 m, within a habitat dominated by Lantana bushes (Image 3). Notably, earlier records did not document this species within the sanctuary (Singh 2009).

8. Conjoined Swift *Pelopidas conjuncta* Herrich-Schäffer, 1869. An uncommon species, *P. conjuncta* is considered locally rare in Uttarakhand (Singh et al. 2016). It prefers forested and woodland habitats, with its range extending up to 2,000 m in the Himalaya. Photographed at an elevation of 1,870 m in an oak-mix forest on 05 March 2021, this species has now been added to the butterfly fauna of the sanctuary (Image 3).

9. Pointed Lineblue *Ionolyce helicon*. The Pointed Lineblue, *Ionolyce helicon*, is a characteristic montane lycaenid of the Himalayan region, often encountered in

Table 1. Sampling sites, altitude, coordinates and habitat type.

Site	ID	Elevation (m)	Habitat types
Agastyamuni	S1	895	Oak pine mixed forest with cropland
Chandrapuri	S2	990	Hill stream with oak, pine, and mixed forest
Sari	S3	2242	Oak mixed forest
Deoriyatal	S4	2417	Oak mixed forest
Tungnath	S5	3436	Oak-Blue Pine-Rhododendron mixed forest
Duggalbitta	S6	2488	Blue pine, oak mixed forest
Baniyakund	S7	2805	Oak mixed with Blue Pine
Makkumath	S8	1800	Oak-Rhododendron mixed forest
Guptkashi	S9	2189	Pine mixed forest
Nagjagayi	S10	1800	Pine mixed forest
Gourikund	S11	2324	Pine-Oak mixed forest
Bheembali	S12	2829	Oak with grassland
Lincholi	S13	3493	Oak with blue pine and grassland
Kedarnath	S14	5960	Grassland with flowering plant
Kalimath	S15	1792	Oak-pine mixed forest
Chaumasi	S16	2691	Oak-Deodar mixed forest
Chilode	S17	1870	Oak-Pine mixed forest
Triyuginarayan	S18	1895	Oak-Pine mixed forest
Tausi	S19	2495	Oak-Blue Pine-Deodar mixed forest
Ranshi	S20	2478	Oak- Blue Pine mixed forest
Gondar	S21	2500	Oak mixed with Ringal bamboo forest
Khudara	S22	2127	Oak mixed with Ringal bamboo forest
Bantoli	S23	2800	Oak mixed with Ringal bamboo forest
Nanu	S24	2300	Oak mixed with Ringal bamboo forest
Madmaheswar	S25	3500	Oak-Deodar-Blue Pine mixed forest
Uchola	S26	2000	Oak-Bamboo-Deodar mixed forest
Chopta	S27	1800	Pine-dominated landscape
Malkhi	S28	2300	Oak-Pine mixed forest
Kartikswami	S29	2069	Oak pine Mixed Forest

sheltered forest clearings and along shrub-dominated trails. Unlike the more widespread lowland lineblues, this species shows a stronger association with mid- to high-elevation habitats, making it a notable component of alpine-temperate transition zones. Its occurrence in the KMDS highlights the ecological importance of this protected area in sustaining specialized Himalayan butterfly fauna.

10. Eastern Blue Sapphire *Heliophorus oda*

Hewitson, 1865. *H. oda* is a rare butterfly species in India, primarily found from Himachal Pradesh to Sikkim, including Nepal and Bhutan, at elevations of 2,000–3,500 m (Kehimkar 2016). Previous surveys in the sanctuary did not report its presence (Singh 2009). A single male was documented outside the sanctuary near Mussoorie, with a possible distribution range of 1,500–3,000m in Uttarakhand (Singh et al. 2016). In our observation, *H. oda* was observed in 07 October 2022 in an oak-dominated forest at 1,800 m near Makkumath, KMDS (Image 3).

11. Indian Purple Sapphire *Heliophorus indicus* Fruhstorfer. The Indian Purple Sapphire, *Heliophorus indicus*, is a localized Himalayan butterfly largely restricted to cool temperate forests and higher montane landscapes. It is usually observed in sunny openings, where males display rapid fluttering flight and frequently settle on low herbs or damp patches. Due to its narrow elevation preference and comparatively scattered distribution, the presence of this sapphire in Kedarnath Musk Deer Sanctuary is significant, indicating the sanctuary's role as a refuge for specialized high-altitude lycaenid species.

12. Purple Sapphire *Heliophorus epicles* Godart, 1824. *H. epicles*, a locally rare species, had previously been reported in Uttarakhand. Prior studies, particularly in the sanctuary (Singh 2009) lacked clarity regarding the species' presence. In the current study, this species was photographed on 27 September 2020, at an elevation of 1,980 m in a mixed oak-rhododendron forest (Image 3).

13. Golden Sapphire *Heliophorus brahma* Moore, 1858. *H. brahma* is a small butterfly with a rare presence in Uttarakhand and scarce records in the western Himalayas. Previous studies have documented the species in various parts of Uttarakhand (Uniyal 2004; Kunte et al. 2019). Its presence is lacking in the earlier research (Singh 2009). *H. brahma* was recorded at an elevation of 2,130 m, in a moist habitat near a stream dominated by *Rosa brunonii* bushes. The butterfly was observed to be active throughout the day in May and June (Image 3).

14. Azure Sapphire *Heliophorus moorei coruscans*. The Azure Sapphire is a high-altitude Himalayan subspecies typically associated with temperate oak–rhododendron forests and alpine meadows during the summer flight season. It is most often encountered in sunlit forest openings and along moist hill paths, where individuals frequently feed on small-flowered herbs. Its documentation from KMDS reflects the sanctuary's rich montane butterfly assemblage and emphasizes the importance of conserving these fragile alpine–temperate

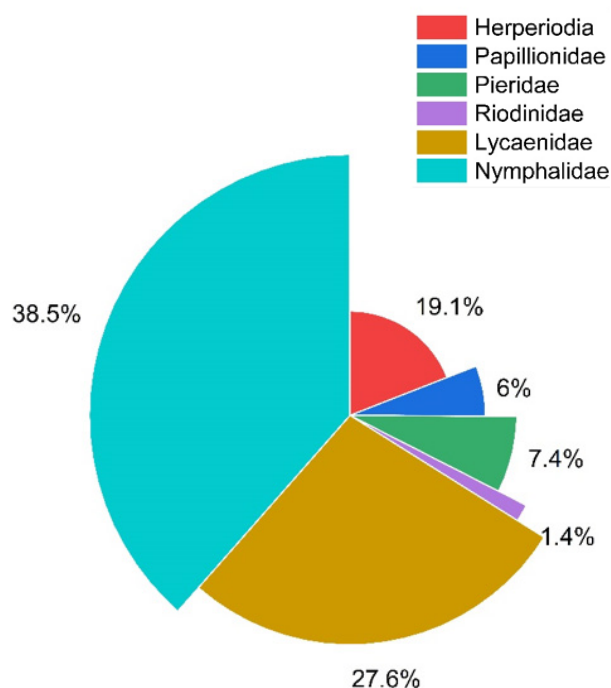


Image 2. Family composition of butterflies in Kedarnath Musk Deer Sanctuary.

ecotones that support such visually distinctive and habitat-sensitive lycaenids.

15. Silverstreak Blue *Iraota timoleon* Stoll, 1790. *I. timoleon*, an uncommon butterfly previously recorded only at lower elevations in Uttarakhand (Kunte et al. 2019), was not listed in earlier KMDS documentation (Singh 2009). Its presence is now confirmed with a sighting on 11 March 2018, at 1030 m in a shrubby habitat near an oak forest (Image 3).

16. Broad Spark *Sinthus chandrana* is a forest-associated lycaenid typically encountered in shaded valleys and lower temperate zones of the Himalaya. Unlike the bright sapphires and lineblues that frequent open sunny patches, this species is more secretive and rarer in Uttarakhand (Singh et al. 2016), often remaining close to understory vegetation and appearing briefly along forest trails. Its occurrence in Kedarnath Musk Deer Sanctuary highlights the presence of intact woodland microhabitats that support less conspicuous but ecologically important members of the Himalayan butterfly community.

17. Himalayan Pierrot *Tarucus venosus* Moore, 1882. A common butterfly species typically found in the Himalayan foothills at elevations up to 1,200 m in Uttarakhand (Kunte et al. 2019). Observations and photographs of several individuals were recorded during our survey in the sanctuary. This species was notably

more frequently observed in July, at elevations up to 2,100 m, primarily within oak-mixed forest habitats (Image 3).

18. Orchid Tit *Chliaria othona* is a characteristic Himalayan lycaenid strongly associated with moist temperate forests and shaded hill slopes. It is typically observed flying low near bushes or resting quietly beneath leaves, making it easy to overlook during rapid surveys. The species is common at low elevations in Uttarakhand, but no records have been reported from the Kedarnath Musk Deer Sanctuary (Singh 2009). The species is often linked with well-preserved forest habitats, and its record from KMDS supports the importance of this protected landscape in maintaining specialized butterfly fauna dependent on cool, undisturbed woodland conditions.

19. Silver Forget-me-not *Catochrysops panormus* is a widespread lycaenid butterfly typically found in open grassy patches, forest edges, and disturbed habitats where low herbaceous vegetation is abundant. This species typically prefers low elevation (Kehimkar 2016). This is the first record from KMDS and its presence reflects the mosaic of open and semi-open microhabitats within the sanctuary that support both generalist and montane butterfly assemblages.

20. Dusky Blue Cupid *Everes huegelii huegelii* is a characteristic Himalayan blue largely confined to montane and subalpine zones, where it inhabits open slopes, alpine meadows, and flower-rich clearings during the short summer season (Kehimkar 2016). The species is often observed nectaring on small herbs and is considered a typical representative of high-elevation lycaenid fauna. This is the first record from the KMDS.

21. Common Silverline *Spindasis vulcanus* is a conspicuous lycaenid typically associated with dry scrub, forest edges, and open hill slopes. Unlike many high-altitude sapphires restricted to cool-temperate forests, this species is more robust and often occurs in warmer, lower-montane habitats with scattered shrubs. Its records from the KMDS indicate heterogeneous edge habitats that support both open-country and forest-margin butterfly species.

22. Scarce Shot Silverline *Spindasis elima* is a Himalayan lycaenid typically encountered along wooded slopes, scrubby clearings, and montane forest margins. Compared to the more widespread *S. vulcanus*, this species is less frequently observed and shows a stronger association with intact mid-elevation habitats. This is the first documentation from KMDS.

23. Orange-bordered Argus *Aricia agestis nazira* is a high-altitude subspecies, usually associated with alpine meadows, rocky slopes, and herb-rich grasslands

during the summer months. Its presence is often linked with cold-adapted montane ecosystems, where it flies close to the ground and frequently settles on low vegetation. The record of this argus from KMDS highlights the sanctuary's alpine butterfly diversity and the ecological value of its meadow habitats within the greater Himalayan landscape.

24. Veined Labyrinth *Neope pulaha* is a temperate forest butterfly commonly associated with shaded woodland trails, moist ravines, and dense understory vegetation in the Himalaya. Unlike open-habitat lycaenids, this species prefers low-light environments and is often observed resting on tree trunks or leaf litter, relying on its cryptic underside markings for concealment. It is uncommon in Uttarakhand (Singh et al. 2016), and its presence in the KMDS indicates the existence of well-preserved forest microhabitats that support satyrine butterflies adapted to cool, shaded montane ecosystems.

25. Dark Evening Brown *Melanitis phedima bela* is a shade-loving satyrine butterfly frequently active during late afternoon and dusk, unlike most daytime-flying Himalayan species. It is typically encountered at forest edges, in shaded clearings, and in moist valleys, where it rests quietly among leaf litter. The species is well known for its remarkable dry-season camouflage, mimicking dead leaves, which enhances survival in fluctuating Himalayan environments. This is the first record from KMDS.

26. Dark Himalayan Oakblue *Arhopala rama* is a forest-dependent Himalayan Oakblue closely associated with mature broadleaf temperate forests, particularly oak-dominated habitats. Species of *Arhopala* are often considered indicators of intact woodland ecosystems because they depend on specific host plants and shaded canopy environments. This species is not rare but vagrant, and is found mostly during the post-monsoonal season.

DISCUSSION

The earlier study, conducted over a decade ago, seems to have overlooked substantial portions of the butterfly fauna, likely due to a combination of fragmentary surveys and habitat variation within the sanctuary. The present study recorded 300 butterfly species, substantially exceeding the 147 species previously reported by Singh (2009), suggesting that earlier inventories may not have fully captured the butterfly diversity of KMDS. The additional 153 species, including several rare

and uncommon species, highlight the need for more comprehensive, periodic biodiversity assessments in the ecologically rich Sanctuary. Underestimation of regional biodiversity, including butterflies, may significantly challenge the development of effective conservation planning and management strategies. Given that KMDS encompasses a broad elevation gradient of approximately 500–7,068 m above sea level, while the present surveys covered elevations of 800–5,960 m, the diversity of habitats within the sanctuary is likely to contribute substantially to regional butterfly diversity. The sanctuary encompasses subtropical forests at lower altitudes, temperate forests at mid-elevations, and alpine meadows at higher altitudes, each offering unique ecological niches for butterflies (Jaryan et al. 2013; Uniyal et al. 2013), but probably lacks adequate cover during the survey, particularly in the more inaccessible high-altitude regions.

The presence of newly recorded species in KMDS suggests that the Sanctuary provides critical habitat for both common and rare butterflies, contributing to regional and possibly national biodiversity conservation. The addition of these species in the current study, and their absence in earlier surveys, highlight the importance of long-term monitoring to account for seasonal and interannual variations in species presence and abundance. Furthermore, the addition of other rare and uncommon species like *Miletus chinensis*, *Belenois aurota*, *Hestina persimilis*, *Pelopidas conjuncta*, *Baoris farri*, *Arhopala centaurus*, *Horaga viola*, *Pedesta masuriensis*, *Ampittia subvittatus*, *Symbrenthia hypselis*, and *Limenitis trivena*, not only enriches the sanctuary's biodiversity inventory but also emphasizes the region's potential as a refuge for lesser-known, often overlooked species. The presence of such species aligns with studies conducted in other Himalayan regions, where highly localized or rare species have been found to persist in isolated pockets of suitable habitat (Dawar et al. 2022).

Additionally, this study aligns with research conducted in other parts of the Himalayas, where recent surveys have revealed previously unknown species, indicating that many regions may still harbour undiscovered biodiversity (Ghazoul 2006). For example, Sharma et al. (2019) documented several first-time records of butterfly species in neighbouring areas of Uttarakhand, suggesting that the Western Himalayas, despite being well-studied, continue to yield surprises regarding species diversity. This highlights the dynamic nature of biodiversity in mountainous regions, where microhabitats, climatic variations, and elevation play crucial roles in shaping species distributions (Mani

Table 2. Updated checklist of butterflies (Lepidoptera: Papilionoidea) recorded from Kedarnath Musk Deer Sanctuary, Uttarakhand, India.

	Species name	Common name	Relative abundance	Habitat preference and elevation (m)
A. Super family: Hesperioidea				
i. Family: Hesperidae				
A. Sub-family: Coeliadinae				
1	<i>Bibasis sena</i>	Orange Tail Awl	Uncommon	Moist forest up to 1500
2	<i>Hosora chromus</i>	Common-banded Awl	Rare	Forest edges up to 2000
3	<i>Hasora taminatus</i> Hübner	White-banded Awl	Uncommon	Forest edges up to 2000
4	<i>Burara harisa</i> Moore	Orange Awlet	Uncommon	Forest edges up to 1500
5	<i>Berara oedipodea</i>	Branded Orange Awlet	Uncommon	Hill forests up to 1500
6	<i>Choaspes benjaminii</i>	Indian Awlking	Uncommon	Forests 300–2400
b. Sub-family: pyrginae				
7	<i>Celaenorrhinus leucocera</i>	Common Spotted Flat	Common	Forest up to 2500
8	<i>Celaenorrhinus munda</i> Moore	Himalayan Spotted Flat	Uncommon	Forest up to 2000
9	<i>Celaenorrhinus pero</i>	Mussorie Spotted Flat	Common	Hill forests 1500–2000
10	<i>Pseudocoladenia dan</i>	Fulvous Pied Flat	Common	Forest edges up to 2200
11	<i>Celaenorrhinus dhanada</i>	Himalayan Yellow Flat	Rare	Forest edges 300–1800
12	<i>Tagiades japetus</i> Stoll	Common Snow Flat	Uncommon	Forest up to 1000
13	<i>Tagiades menaka</i>	Spotted Snow Flat	Common	Hill forests 1500–2000
14	<i>Tagiades litigiosa</i> Möschler	Water Snow Flat	Common	Forest up to 2000
15	<i>Sarangesa dasahara</i> Moore	Common Small Flat	Common	Grassland and forest edges
16	<i>Caprona agama</i>	Spotted Angle	Uncommon	Grassland and forest edges
17	<i>Caprona ransonneti</i>	Golden Angle	Uncommon	Forest and forest edges
18	<i>Odontoptilum angulatum</i>	Chestnut Angle	Common	Forests up to 2400
19	<i>Spialia galba</i> Fabricius	Indian Skipper	Common	Grassland and forest 2500
c. Sub-family: Hesperinae				
20	<i>Aeromachus dubius</i>	Dingy Scrub Hopper	Uncommon	Grassland up to 2000
21	<i>Aeromachus stigmata</i> Moore	Veined Scrub Hopper	Uncommon	Forest 1500–2100
22	<i>Aeromachus jhora</i> de Nicéville	Grey Scrub Hopper	Uncommon	Forest up to 1800
23	<i>Ochus subvittatus</i>	Tiger Hopper	Rare	Forest up to 1000
24	<i>Sovia grahami</i> Evans	Graham Ace	Rare	Forest up to 1500
25	<i>Pedesta masuriensis</i> Moore	Mussoorie Bush Bob	Rare	Hill forests 1500–2000
26	<i>Notocrypta feisthamalli alysos</i>	Spotted Demon	Common	Forest edges 300–2500
27	<i>Udaspes folus</i> Cramer	Grass Demon	Common	Grassland and forest 2500
28	<i>Taractrocera danna</i> Moore	Himalayan Grass Dart	Uncommon	Forest up to 1500–2200
29	<i>Potanthus dara</i>	Himalayan Dart	Uncommon	Forest up to 1700
30	<i>Ampittia dioscorides</i> Fabricius	Bush Hopper	Common	Forest up to 1000
31	<i>Suastus gremius</i> Fabricius	Indian Palm Bob	Common	Forest up to 1200
32	<i>Hyarotis adrastus praba</i> Moore	Tree Flitter	Common	Forest up to 1600
33	<i>Matapa aria</i> Moore	Common Red eye	Common	Forest up to 1000
34	<i>Eurionota torus</i>	Rounded Palm Red-eye	Rare	Forest up to 1500
35	<i>Taractrocera maevius</i>	Common Grass Dart	Common	Grassland and scrub 1600
36	<i>Oriens golo gola</i> Moore	Common Dartlet	Common	Forest low elevation
37	<i>Potanthus pseudomaesa pseudomaesa</i> Moore	Common Dart	Common	Hill forest up to 1200
38	<i>Telicota bambusae bambusae</i>	Dark Palm Dart	Common	Forest edges up to 1500
39	<i>Baoris farri</i> Moore	Paintbrush Swift	Rare	Forest up to 1100
40	<i>Gegenes nostradamus</i>	Dingy Swift	Rare	Forest clearing at low elevation

	Species name	Common name	Relative abundance	Habitat preference and elevation (m)
41	<i>Parnara guttatus</i>	Straight Swift	Common	Forest up to 2400
42	<i>Parnara ganga</i>	Continental Swift	Common	Forest edges at low elevation
43	<i>Parnara guttatus</i>	Oriental Straight Swift	Common	Grassland and drier plains
44	<i>Borbo cinnara</i>	Rice Swift	Uncommon	Forest up to 1000
45	<i>Pseudoborbo bevani</i>	Bevan's Swift	Uncommon	Forest up to 2100
46	<i>Pelopidas subochracea</i>	Large branded swift	Uncommon	Forest up to 2400
47	<i>Pelopidas conjuncta</i>	Conjoined Swift	Rare	Forest edges up to 1200
48	<i>Polytremis discreta</i>	Himalayan Swift	Uncommon	Hill forest up to 3000
49	<i>Polytremis eltola</i>	Yellow spot swift	Common	Forest 300–3000
50	<i>Pelopidas mathias</i>	Small Branded Swift	Common	Grassland and scrub 2200
51	<i>Halpe homolea aucma</i> Swinhoe	Indian Ace	Uncommon	Forest low elevation
52	<i>Suastus gremius</i> Fabricius	Indian Palm Bob	Common	Forest up to 1000
53	<i>Matapa aria</i> Moore	Common Redeye	Common	Forest up to 1000
54	<i>Notocrypta curvifascia</i>	Restricted Demon	Common	Forest up to 400–1800
55	<i>Notocrypta feisthamelii</i>	Spotted Demon	Common	Forest up to 1000–2500
56	<i>Udaspes folus</i> Cramer	Grass Demon	Common	Forest up to 2200
B. Super family: Papilionoidea				
1. Family: Papilionidae				
A. Sub-family: Parnassiinae				
57	<i>Parnassius epaphus epaphus</i>	Common Red Apollo	Uncommon	Rocky hillsides 2000–5000
58	<i>Parnassius hardwickii</i>	Common Blue Apollo	Uncommon	Alpine meadow up to 5000
b. Sub-family: Papilioninae				
59	<i>Troides aeacus aeacus</i> Felder & Felder	Golden Birdwing	Common	Forest up to 2700
60	<i>Graphium eurous caschmirensis</i> Rothschild	Six-Bar Swordtail	common	Hill forest up to 2700
61	<i>Graphium cloanthus</i>	Glassy Bluebottle	common	Hill forest up to 2700
62	<i>Graphium sarpedon</i>	Common Bluebottle	common	Forest up to 2700
63	<i>Graphium dason</i>	Common Jay	common	Forest and garden 1200
64	<i>Byasa polyeuctes</i>	Common Wildmill	common	Forest up to 3500
65	<i>Byasa latreillei</i>	Rose Windmill	common	Hill forest up to 2700
66	<i>Byasa dasarada Ravana</i> Moore	Great windmill	Uncommon	Forest up to 3600
67	<i>Pachliopta aristolochiae</i>	Common Rose	Uncommon	Grassland up to 2400
68	<i>Atrophaneura aidoneus</i> Doubleday	Lesser Batwing	Uncommon	Forest up to 2600
69	<i>Papilio protenor</i> Cramer	Spangle	common	Forest up to 2600
70	<i>Papilio bianor polycctor</i> Boisduval	Common Peacock	common	Hill Forest up to 2500
71	<i>Papilio polytes</i>	Common Mormon	common	Grassland up to 1900
72	<i>Papilio machaon asiaticus</i> Ménétériés	Common Yellow Swallowtail	Uncommon	Meadows and scrub 4800
73	<i>Meandrusa lachinus lachinus</i> Fruhstorfer	Brown Gorgon	Uncommon	Hill forest up to 2600
74	<i>Papilio demoleus demoleus</i> Linnaeus	Lime Butterfly	common	Cropland and forest edges
2. Family: Pieridae				
A. Sub-family: Coliadinae				
75	<i>Eurema andersonii</i> Moore	One-spot Grass yellow	Uncommon	Forest up to 2200
76	<i>Eurema blanda silhetana</i> Wallace	Three-spot Grass yellow	Common	Forest up to 1700
77	<i>Eurema brigitta rubella</i> Wallace	Small Grass yellow	Common	Forest clearing up to 3660
78	<i>Eurema hecabe</i> Linnaeus	Common Grass yellow	Common	Forest up to 3000
79	<i>Eurema laeta</i>	Spotless Grass yellow	Common	Forest up to 2500
80	<i>Gonepteryx rhamni nepalensis</i> Doubleday	Common Brimstone	Very Common	Forest up to 2500

	Species name	Common name	Relative abundance	Habitat preference and elevation (m)
81	<i>Catopsilia pomona</i>	Common Emigrant	Common	Forest up to 2500
82	<i>Catopsilia pyranthe</i> Linnaeus	Mottled Emigrant	Common	Forest and habitation 3000
83	<i>Colias erate</i> Esper	Pale clouded Yellow	Uncommon	Open hillsides 3500
B. Sub-family: Pierinae				
84	<i>Pieris daplidice moorei</i> Röber	Bath White	Common	Meadow scrub 2700
85	<i>Pieris canidia indica</i>	Indian Cabbage White	Common	Forest and farmland 3500
86	<i>Pieris brassicae nepalensis</i> Doubleday	Large Cabbage White	Common	Meadow, scrub up to 4000
87	<i>Pieris rapae</i>	Small cabbage White	Common	Hill slopes up to 1800
88	<i>Pieris bryoniae</i>	Mountain Greenvein White	Uncommon	Hill forest 1200–3000
89	<i>Aporia leucodice soracta</i> Moore	Himalayan Blackvein	Common	Forest up to 3000
90	<i>Aporia agathon caphusa</i>	Great Black veined	Very Common	Hill forest up to 3050
91	<i>Delias eucharis</i> Drury	Common Jezebel	Very Common	Garden and forest low elevation
92	<i>Delias belladonna horsfieldii</i>	Hill Jezebel	Very Common	Forest up to 3000
93	<i>Cepora nerissa Phryne</i> Fabricius	Common Gull	Very Common	Grassland up to 2500
94	<i>Appias libythea</i> Fabricius	Striped Albatross	Rare	Forest edges up to 1000
95	<i>Leptosia nina</i> Fabricius	Psyche	Common	Forest up to 1900
96	<i>Belenois aurota</i> Fabricius	Pioneer	Common	Grassland and scrub 2800
3. Family: Riodinidae				
A. Sub-family: Riodininae				
97	<i>Abisara bifasciata</i>	Plum Judy	Common	Forest and garden 2000
98	<i>Abisara fylla</i>	Dark Judy	Common	Forest up to 2000
99	<i>Zemeros flegyas indicus</i>	Punchinello	Common	Forest 2300
100	<i>Dodona eugenes</i> Bates	Tailed Punch	Rare	Hill forest up to 3000
101	<i>Dodona durga</i> Kollar	Common Punch	Common	Hill forest up to 2500
4. Family: Lycaenidae				
A. Sub-family: Poritiinae				
102	<i>Poritia hewitsoni hewitsoni</i> Moore	Common Gem	Uncommon	Forest up to 1200
b. sub-family: Miletinae				
103	<i>Miletus chinensis assamensis</i>	Common Brownie	Rare	Hill forest up to 1500
C. Sub-family: Curetinae				
104	<i>Curetis acuta</i> Moore	Angled Sunbeam	Common	Forest up to 1700
105	<i>Curetis bulis</i> Westwood	Bright Sunbeam	Common	Forest up to 2100
D. Sub-family: Aphnaeinae				
106	<i>Spindasis nipalicus</i> Moore	Silver Grey Silverline	Uncommon	Hill forest up to 2500
107	<i>Spindasis vulcanus</i>	Common Silverline	Common	Plain and hills up to 2700
108	<i>Spindasis elima</i>	Scarce Shot Silverline	Uncommon	Hill forest up to 3000
109	<i>Spindasis lohita</i>	Long-banded Silverline	Common	Grassy open area
110	<i>Apharitis lilacinus</i>	Lilac Silverline	Rare	Forest up to 1600
E. Sub-family: Polyommatae				
111	<i>Everes argiades diporides</i> Chapman	Chapmans Cupid	Common	Forest up to 2600
112	<i>Chilades pandava pandava</i> Horsfield	Plain Cupid	Common	Forest edges up to 2400
113	<i>Chilades parrhasius parrhasius</i> Fabricius	Indian Cupid	Common	Grassland and forest 2000
114	<i>Chilades lajus lajus</i> Stoll	Lime Blue	Common	Grassland and forest 1900
115	<i>Anthene emolus</i>	Common Ciliated Blue	Common	Hill forest up to 1300
116	<i>Petrelaea dana</i>	Dingy Lineblue	Common	Forest low elevation
117	<i>Nacaduba kurava</i>	Transparent Six Lineblue	Uncommon	Hill forest 1000–2000
118	<i>Ionolyce helicon</i>	Pointed Line Blue	Uncommon	Forest up to 1000

	Species name	Common name	Relative abundance	Habitat preference and elevation (m)
119	<i>Everes (argiades) indica</i> Evans	Tailed Cupid	Uncommon	Hill forest 1400–3000
120	<i>Everes huegelii huegelii</i>	Dusky Blue Cupid	Uncommon	Hill forest 1400–2850
121	<i>Acytolepis puspa gisca</i> Fruhstorfer	Common hedge Blue	Common	Forest up to 3000
122	<i>Oreolyce vardhana vardhana</i> Moore	Dusky Hedge Blue	Uncommon	Forest 400–2500
123	<i>Udara dilecta dilecta</i> Moore	Pale Hedge Blue	common	Hill forest 500–3000
124	<i>Udara albocerulea</i> Moore	Albocerulean	Rare	Hill forest below 1000
125	<i>Celastrina lavendularis limbata</i> Moore	Plain Hedge Blue	common	Forest 400–2500
126	<i>Celastrina gigas</i> Hemming	Silver Hedge Blue	Common	Forest clearing 2000–3000
127	<i>Celastrina huegelii huegelii</i> Moore	Large Hedge Blue	Common	Forest up to 3000
128	<i>Celatoxia marginata</i> de Nicéville	Margined Hedge Blue	Common	Hill Forest up to 3000
129	<i>Celastrina argiolus kollari</i> Linnaeus	Hill Hedge Blue	Uncommon	Meadow and forest 3000
130	<i>Zizeeria karsandra</i> Moore	Dark Grass Blue	common	Grassland and forest 2500
131	<i>Pseudozizeeria maha</i> Kollar	Pale Grass Blue	Common	Grassland and forest 2500
132	<i>Zizeeria oits oits</i> Fabricius	Lesser Grass Blue	Common	Grassland and forest 2500
133	<i>Lampides boeticus</i> Linnaeus	Pea Blue	common	Hills and plain up to 3000
134	<i>Leptotes plinius Plinius</i> Fabricius	Zebra Blue	Common	Grassland and forest 2100
135	<i>Euchrysops cnejus</i>	Gram Blue	Common	Grassland and forest edges
136	<i>Aricia agestis nazira</i>	Orange-bordered Argus	common	Forest edges 1800–3000
137	<i>Lycaena phlaeas</i>	Common Copper	Uncommon	Hill Forest 1500–3000
138	<i>Lycaena panava</i>	White-bordered Copper	Common	Meadow forest edges 3690
139	<i>Jamides bochus</i> Stoll	Dark Cerulean	Common	Forest up to 2400
140	<i>Jamide celeno</i>	Common Cerulean	Uncommon	Forest up to 2000
141	<i>Catochrysops strabo</i> Fabricius	Forget-me-not Blue	Common	Hill and plain up to 3000
142	<i>Catochrysops panormus</i>	Silver Forget-me-not	Uncommon	Low elevation up to 1000
143	<i>Castalius rosimon</i>	Common Pierrot	Common	Grassland and forest 2500
144	<i>Tarucus venosus</i> Moore	Himalayan Pierrot	Common	Forest edge and scrub 2000
145	<i>Talicauda nyseus</i>	Red Pierrot	Common	Forest up to 1600
146	<i>Tarucus nara</i>	Rounded Pierrot	Common	Grassland and Forest 2000
147	<i>Freyeria trochylus</i> Freyer	Grass Jewel	Common	Forest edges up to 1800
F. Sub-family: Theclinae				
148	<i>Euaspa millionia</i> Hewitson	Water Hairstreak	Common	Hill forest 1200–2000
149	<i>Chrysozephyrus syla</i> Kollar	Silver Hairstreak	Common	Hill forest 1800–3500
150	<i>Chrysozephyrus birupa</i> Moore	Fawn Hairstreak	Common	Forest up to 1600
151	<i>Euaspa ziha</i> Hewitson	White-spotted Hairstreak	Uncommon	Forest up to 1500
152	<i>Chrysozephyrus disparatus psedoletha</i>	Howarth's Hairstreak	Rare	Hill Forest up to 2000
153	<i>Horaga viola</i> Moore	Brown Onyx	Rare	Hill Forest up to 2000
154	<i>Haraga Onyx</i> Moore	Common Onyx	Uncommon	Hill Forest up to 2000
155	<i>Iraota timoleon</i> Stoll	Silvertreak Blue	Uncommon	Hill Forest up to 2000
156	<i>Chaetoprocta odata peilei</i> Forster	Walnut Blue	Uncommon	Hill forest 1200–3600
157	<i>Arhopala rama</i> Kollar	Dark Himalayan Oakblue	Common	Hill forest 900–2000
158	<i>Arhopala paraganesa</i> de Nicéville	Dusky Bush Blue	Rare	Hill Forest up to 2000
159	<i>Tajuria diaeus</i> Hewitson	Straight-line Royal	Rare	Hill forest up to 1200
160	<i>Ancema ctesia</i> Hewitson	Bio-spot Royal	Uncommon	Forest up to 2000
161	<i>Pratapa icetas</i> Hewitson	Dark blue Royal	Rare	Hill sides 1000–2000
162	<i>Chliaria kina</i> Hewitson	Blue Tit	Uncommon	Hill Forest up to 2000
163	<i>Chliaria othona</i>	Orchid Tit	Uncommon	Hill Forest up to 1500
164	<i>Deudorix epijarbus</i> Moore	Cornelian	Uncommon	Forest up to 2500

	Species name	Common name	Relative abundance	Habitat preference and elevation (m)
165	<i>Rapala selira</i> Moore	Himalayan Red Flash	Common	Hill Forest up to 3000
166	<i>Arhopala dodonea</i> Moore	Pale Himalayan Oakblue	Common	Hill sides 1000-2000
167	<i>Arhopala amantes</i>	Large Oakblue	Common	Forest up to 1500
168	<i>Arhopala ganesa</i>	Tailless Bush Blue	Very Common	Forest up to 1700
169	<i>Surendra quercetorum</i>	Common Acacia Blue	Common	Forest up to 1500
170	<i>Arhopala atrax</i> Hewitson	Indian oak Blue	Very Common	Hill Forest up to 2000
171	<i>Surendra vivarna</i> Moore	Common Acacia Blue	Common	Forest up to 1200
172	<i>Rapala nissa</i> Kollar	Common Flash	Common	Grassland and forest 2000
173	<i>Rapala varuna</i>	Indigo Flash	Common	Plain and hills up to 1500
174	<i>Rapala manea schistacea</i> Moore	Slate Flash	Common	Plain and hills up to 1900
175	<i>Rapala iarbus</i> Fabricius	Indian Red Flash	Uncommon	Grassland and forest 2300
176	<i>Zesius chrysomallus</i> Hübner	Red Spot	Rare	Forest low elevation
177	<i>Catapaecilma major major</i> Druce	Common Tinsel	Rare	Forest up to 1500
178	<i>Sinthusia chandrana chandrana</i> Moore	Broad Spark	Rare	Forest up to 1700
179	<i>Virachola isocrates</i> Fabricius	Common Guava Blue	Uncommon	Forest up to 2000
G. Sub-family: Lycaeninae				
180	<i>Heliophorus brahma</i>	Golden Sapphire	Uncommon	Hill forest up to 2000
181	<i>Heliophorus epicles</i>	Purple Sapphire	Uncommon	Hill forest up to 2000
182	<i>Heliophorus indicus</i>	Indian Purple Sapphire	Uncommon	Hill forest up to 2000
183	<i>Heliophorus sena</i> Kollar	Sorrel Sapphire	Common	Hill forest up to 2600
184	<i>Heliophorus tamu</i>	Powdery Green Sapphire	Common	Hill forest up to 2000
185	<i>Heliophorus moorei tytleri</i>	Azure Sapphire	Common	Hill forest up to 2700
186	<i>Heliophorus oda</i> Hewitson	Eastern Blue Sapphire	Rare	Hill forest up to 1800
187	<i>Arhopala centaurus</i> , 1775	Centaur Oakblue	Uncommon	Hill forest up to 2400
188	<i>Arhopala oenea</i> Hewitson	Hewitson Dull Oakblue	Rare	Hill forest 600–1500
189	<i>Lycaena pavana</i> Kollar	White-bordered Copper	Common	Hill forest up to 3000
190	<i>Lycaena phlaeas baralacha</i> Moore	Common Copper	Common	Hill forest up to 3500
Family: Nymphalidae				
Sub-family: Satyrinae				
191	<i>Mycalis nicotia</i> Westwood	Bright-eyed Bush Brown	Rare	Hill forest 500–1500
192	<i>Mycalis perseus Blasius</i> Fabricius	Common Bush Brown	Common	Forest up to 1700
193	<i>Mycalis francisca Sanatana</i> Moore	Lilacine Bush Brown	Common	Hill forest 500–2000
194	<i>Mycalis mineus</i> Linnaeus	Darkbrand Bush Brown	Common	Forest edges up to 1500
195	<i>Mycalis visala</i>	Long-branded Bush Brown	Common	Forest edges up to 1000
196	<i>Lethe sidonis</i> Doherty	Common Woodbrown	Common	Forest edges up to 3100
197	<i>Lethe maitrya maitrya</i> de Nicéville	Bareed Woodbrown	Uncommon	Hill forest 2500–3800
198	<i>Lethe siderea</i> Marshall	Scarce Woodbrown	Rare	Hill forest 2000–2500
199	<i>Lethe insana insana</i> Kollar	Common Forester	Common	Hill forest 1500–2700
200	<i>Lethe rohria</i>	Common Treebrown	Common	Hill forest up to 3000
201	<i>Lethe verma</i> Kollar	Straight-banded Treebrown	Common	Hill forest 900–2700
202	<i>Lethe europa niladana</i> Fruhstorfer	Bamboo Treebrown	Common	Forest edges up to 3000
203	<i>Lethe confusa confusa</i> Aurivillius	Banded Treebrown	Common	Forest edges up to 1700
204	<i>Lethe baladeva aisa</i> Fruhstorfer	Treble Silverstreak	Rare	Hill forest 1800–2700
205	<i>Lethe goalpara</i>	Large Golden Fork	Rare	Hill forest 1800–3000
206	<i>Neope yama buckleyi</i> Talbot	Dusky Labyrinth	Uncommon	Hill forest 1200–2400
207	<i>Neope pulaha pandya</i> Talbot	Veined Labyrinth	Uncommon	Hill forest 1600–2400
208	<i>Orinoma damaris damaris</i> Gray	Tiger Brown	Uncommon	Forest 1300–2000

	Species name	Common name	Relative abundance	Habitat preference and elevation (m)
209	<i>Melanitis phedima bela</i> Cramer	Dark Evening Brown	Uncommon	Hill forest at low elevation
210	<i>Melanitis leda leda</i> Linnaeus	Common Evening Brown	Very Common	Forest up to 1200
211	<i>Melanitis zitenius zitenius</i> Herbst	Great Evening brown	Very Rare	Forest up to 1700
212	<i>Elymnias hypermnestra undularis</i> Linnaeus	Common Palmfly	Common	Forest and garden 1500
213	<i>Elymnias malelas</i>	Spotted Palmfly	Uncommon	Forest up to 1500
214	<i>Ypthima (Dallacha) hyagriva</i> Moore	Brown Argus	Rare	Forest clearing 1500–2400
215	<i>Callerebia annada</i>	Ringed Argus	Rare	Scrubby hill 1500–2500
216	<i>Callerebia nirmala</i> Moore	Common Argus	Common	Forest 1300–2800
217	<i>Callerebia scanda</i> Kollar	Pallid Argus	Common	Hill forest 1200–2400
218	<i>Loxerebia narasingha</i>	Mottled Argus	Rare	Hill forest up to 2000
219	<i>Ypthima nareda</i> Kollar	Large Three Ring	Uncommon	Forest up to 600–2500
220	<i>Ypthima asterope</i>	Common Three Ring	Uncommon	Forest up to 1500
221	<i>Ypthima inica</i>	Lesser Three Ring	Uncommon	Open clearing up to 500
222	<i>Ypthima sakra</i> Moore	Himalayan Five Ring	Very Common	Hill forest up to 2000
223	<i>Ypthima baldus</i> Fabricius	Common Five Ring	Very Common	Hill forest up to 2000
224	<i>Ypthima baldus nikea</i>	Moore's Five Ring	Uncommon	Forest 1300–2800
225	<i>Ypthima kedarnathensis</i> Singh	Garhwal Six Ring	Common	Forest up to 1600–2000
226	<i>Ypthima indecora</i> Moore	Western Five Ring	Uncommon	Forest up to 1300–1700
227	<i>Rhaphicera moorei moorei</i> Butler	Small Tawny Wall	Uncommon	Hill forest 1500–2000
228	<i>Lasiommata schakra</i> Kollar	Common Wall	Common	Grassy hillside up to 2500
229	<i>Aulocera swaha swaha</i> Kollar	Common Satyr	Common	Open rocky hillside 3000
230	<i>Aulocera saraswati</i> Kollar	Striated Satyr	Common	Scrub meadow up to 2000
231	<i>Aulocera padma</i> Kollar	Great Satyr	Uncommon	Open hillside 2400–3600
232	<i>Aulocera brahminus dokwana</i> Evans	Narrow-banded Satyr	Rare	Open rocky hillside 4000
1. Sub-family: Apaturinae				
233	<i>Dilipa morgiana</i> Westwood	Golden Emperor	Rare	Hill forest 1500–2000
234	<i>Sephisa dichroa</i> Kollar	Western Courtier	Common	Hill forest 3000
235	<i>Apatura ambica</i> Kollar	Indian Purple Emperor	Rare	Hill forest 1500–2600
236	<i>Euripus nyctelius</i>	Courtesan	Uncommon	Hill forest 1000
237	<i>Hestinalis nama</i> Doubleday	Circe	Uncommon	Hill forest 1500–2000
238	<i>Hestina persimilis zella</i> Butler	Siren	Rare	Hill forest up to 2000
2. Sub-family: Charaxinae				
239	<i>Charaxes dolon dolon</i> Westwood	Stately Nawab	Rare	Hill Forest up to 2500
240	<i>Charaxes athmas athamas</i> Drury	Common Nawab	Uncommon	Hill Forest up to 2000
3. Sub-family: Biblidinae				
241	<i>Ariadne ariadne</i>	Angle Castor	Uncommon	Forest up to 2500
242	<i>Ariadne merione tapestrina</i> Moore	Common Castor	Common	Forest up to 2500
4. Sub-family: Heliconidae				
243	<i>Cupha erymanthis</i>	Rustic	Common	Forest up to 2000
244	<i>Phalanta phalantha</i> Drury	Common Leopard	Common	Forest up to 3000
245	<i>Vagrans egista sinha</i> Kollar	Vagrant	Uncommon	Forest up to 2000
246	<i>Argynnis hyperbius</i> Linnaeus	Indian Fritillary	Uncommon	Grassy hillside up to 3000
247	<i>Argynnis kamala</i>	Common Silverstripe	Common	Forest up to 3500
248	<i>Argynnis childreni sakontala</i> Kollar	Large Silverstripe	Common	Forest clearing 1200–3000
249	<i>Argynnis jainadeva</i>	Himalayan Highbrown Fritillary	Uncommon	Rocky Hillsides 2400–4700
250	<i>Issoria (lathonia) isaea</i> Doubleday	Queen of Spain Fritillary	Common	Alpine meadow up to 5000

	Species name	Common name	Relative abundance	Habitat preference and elevation (m)
1. Sub-family: Acraeinae				
251	<i>Cethosia cyane</i> Drury	Leopard Lacewing	Common	Forest up to 4500
252	<i>Acraea issoria</i> i Hübner	Yellow Coster	Common	Forest up to 2500
253	<i>Acraea violae</i> Fabricius	Tawny Coster	Common	Forest up to 1500
D. Sub-family: Nymphalinae				
254	<i>Junonia iphita iphita</i> Cramer	Chocolate Pancy	Common	Grassland and forest 2100
255	<i>Junonia orithya</i>	Blue Pancy	Common	Grassland and forest 2100
256	<i>Junonia hierta hierta</i> Fabricius	Yellow Pancy	Common	Grassland and forest 2000
257	<i>Junonia lemonias lemonias</i> Linnaeus	Lemon Pancy	Common	Grassland and forest 2000
258	<i>Junonia atlites atlites</i> Linnaeus	Grey Pancy	Common	Grassland and forest 1500
259	<i>Junonia almana almana</i> Linnaeus	Peacock Pancy	Common	Grassland and forest 2100
260	<i>Kaniska canace canace</i> Evans	Blue Admiral	Common	Hill forest 1000-3200
261	<i>Vanessa indica indica</i> Herbst	Red Admiral	Common	Forest, meadow 400–3900
262	<i>Vanessa cardui cardui</i> Linnaeus	Painted Lady	Common	Grassland and forest 4500
263	<i>Aglais caschmirensis aesis</i> Fruhstorfer	Indian Tortoiseshell	Common	Forest, meadow 400–5000
264	<i>Nymphalis xanthomelas fervezens</i> Stichel	Large Tortoiseshell	Common	Hill forest 300–3200
265	<i>Symbrenthia lilaea khasiana</i> Moore	Common Jester	Common	Hill forest 300–2000
266	<i>Symbrenthia hypselis</i>	Spotted Jester	Uncommon	Hill forest 300–2000
267	<i>Symbrenthia brabira</i> Moore	Himalayan Jester	Common	Hill forest 1500–2000
268	<i>Hypolimnas misippus</i> Linnaeus	Danaid Eggfly	Common	Grassland and forest 3000
269	<i>Hypolimnas bolina</i>	Great Eggfly	Common	Grassland and forest 2000
270	<i>Kallima inachus</i>	Orange Oakleaf	Common	Forest up to 2100
A. Sub-family: Cyrestinae				
271	<i>Cyrestis thyodamas</i>	Common Map	Common	Grassland and forest 2100
272	<i>Dichorragia nesimachus</i> Boisduval	Constable	Common	Hill forest 500–2000
273	<i>Stibochiona nicea</i> Gray	Popinjay	Common	Forest up to 1500
274	<i>Psuedergolis wedah</i> Kollar	Tabby	Common	Hill forest 1000–2000
B. Sub-family: Limenitidinae				
275	<i>Neptis ananta</i> Moore	Yellow Sailer	Uncommon	Hill forest 400–2300
276	<i>Neptis hylas</i>	Common Sailer	Common	Grassland and forest 3000
277	<i>Neptis soma butleri</i>	Creamy Sailer	Uncommon	Hill forest up to 2800
278	<i>Neptis mahendra</i> Moore	Himalayan Sailer	Common	Hill forest 1700–3000
279	<i>Neptis sappho astola</i> Moore	Pallas Sailer	Uncommon	Hill forest up to 2000
280	<i>Neptis clinia susruta</i>	Clear Sailer	Uncommon	Forest 500 or low elevation
281	<i>Neptis sankara sankara</i> Kollar	Broad Banded Sailer	Common	Hill forest up to 800-2500
282	<i>Athyma perius</i> Linnaeus	Common Sergeant	Common	Forest edges up to 2700
283	<i>Athyma asura</i> Moore	Studded Sergeant	Uncommon	Forest edges up to 2700
284	<i>Athyma selenophora</i> Kollar	Staff Sergeant	Common	Forest edges up to 2000
285	<i>Athyma opalina</i> Kollar	Himalayan Sergeant	Common	Hill forest 1800–2800
286	<i>Auzakia danava</i> Moore	Commodore	Uncommon	Hill forest 500–2000
287	<i>Limenitis trivena ligyes</i>	Indian White Admiral	Uncommon	Hill forest up to 2700
288	<i>Euthalia patala</i> Kollar	Grand Duchess	Uncommon	Hill forest 400–2500
289	<i>Euthalia sahadeva</i>	Green Duke	Rare	Hill forest 400–2000
290	<i>Symphaedra nais</i> Forster	Baronet	Common	Forest up to 900
291	<i>Euthalia aconthea</i>	Common Baron	Common	Grassland and forest 3000
A. Sub-family: Libytheinae				
292	<i>Libythea myrrha sanguinalis</i> Godart	Common Beak	Common	Hill forest 300–2800

	Species name	Common name	Relative abundance	Habitat preference and elevation (m)
293	<i>Libythia lepita lepita</i> Moore	Club Beak	Common	Hill forest 300–3000
B. Sub-family: Danainae				
294	<i>Danaus chrysippus chrysippus</i> Linnaeus	Plain Tiger	Common	Plain and hills Up to 3000
295	<i>Danaus genutia</i>	Striped Tiger	Common	Forest up to 2800
296	<i>Parantica sita</i> Kollar	Chestnut Tiger	Common	Forest edges up to 3000
297	<i>Tirumala limniace</i>	Blue Tiger	Uncommon	Forest up to 2800
298	<i>Parantica aglea melanoides</i> Moore	Glassy Tiger	Common	Forest edges up to 2800
299	<i>Euploea mulciber</i> Mulciber Cramer	Striped Blue Crow	Common	Plain and hills Up to 2500
300	<i>Euploea core</i> Cramer	Common Indian Crow	Common	Plain and hills Up to 3000



Image 3A–L. Rare rediscoveries of butterflies from the Kedarnath Musk Deer Sanctuary. A—*Melanitis zitenius* | B—*Aeromachus stigmata* | C—*Hasora taminatus* | D—*Catapaecilma major* | E—*Miletus chinensis* | F—*Belenois aurota* | G—*Hestina persimilis* | H—*Pelopidas conjuncta* | I—*Ionolyce helicon* | J—*Heliophorus indicus* | K—*Heliophorus epicles* | L—*Heliophorus indicus*. © Anand Kumar, Priyanshu Kumar, Gourav Lochan, Prachi Arya, Rajeev Lochan.



Image 3M–Aa. Rare rediscoveries of butterflies from the Kedarnath Musk Deer Sanctuary. M—*Heliophorus brahma* | N—*Heliophorus moorei coruscans* | O—*Heliophorus moorei tytleri* | P—*Iraota timoleon* | Q—*Sinthus chandrana* | R—*Tarucus venosus* | S—*Chliaria othona* | T—*Catochrysops panormus* | U—*Everes huegelii huegelii* | V—*Spindasis vulcanus* | W—*Spindasis elima* | X—*Aricia agestis nazira* | Y—*Neope pulaha* | Z—*Melanitis phedima bela* | Aa—*Arhopala rama*. © Anand Kumar, Priyanshu Kumar, Gourav Lochan, Prachi Arya, Rajeev Lochan.

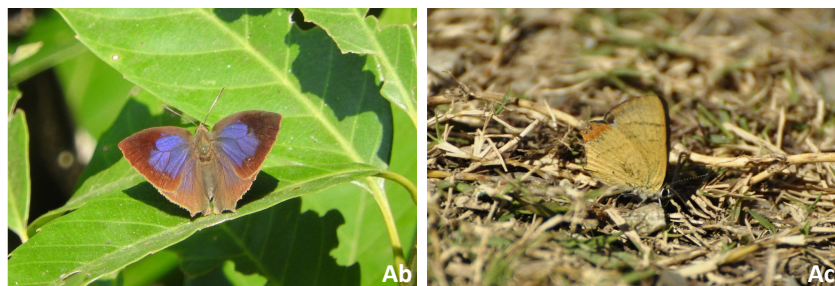


Image 3Ab–Ac. Rare rediscoveries of butterflies from the Kedarnath Musk Deer Sanctuary. Ab—*Arhopala rama* | Ac—*Heliophorus oda*.
© Anand Kumar, Priyanshu Kumar, Gourav Lochan, Prachi Arya, Rajeev Lochan.

1974). The findings of this study not only enrich the existing knowledge of Himalayan butterfly diversity but also underscore the critical need for more extensive and rigorous surveys in the future to ensure the implementation of better conservation strategies. Such efforts are critical to refining conservation strategies, enabling more targeted and effective interventions for species preservation.

CONCLUSION

This exploration of butterfly diversity within KMDS is a foundation for further research and conservation initiatives. A total of 153 additional butterflies' species were updated in the known butterfly fauna of KMDS. Several new records and rediscoveries of butterfly species were documented in the sanctuary. By unravelling the intricate connections between butterflies and their environment, a deeper appreciation for the sanctuary's ecological complexity and the need to preserve it emerged. This comprehensive methodology, combining transect surveys, elevation gradient sampling, and a multifaceted data-collection approach, aimed to provide a thorough understanding of butterfly diversity in the KMDS. One often-overlooked but ecologically significant component of this biodiversity is the diverse butterfly population that graces the Sanctuary's meadows and forests.

Significance

The significance of this research extends beyond the academic realm; it holds practical implications for the conservation and management of KMDS. With threats such as climate change and habitat degradation looming large, an understanding of butterfly species and their interactions within this fragile ecosystem becomes imperative. By unravelling the mysteries of

butterfly ecology in Kedarnath, this research contributes valuable insights that will inform conservation strategies and emphasize the need to preserve this Himalayan Sanctuary for future generations.

REFERENCES

- Acharya, B.K. & L. Vijayan (2015). Butterfly diversity along the elevation gradient of eastern Himalaya, India. *Ecological Research* 30(5): 909–919. <https://doi.org/10.1007/S11284-015-1292-0>
- Ara, Z.G. & A.R. Haque (2021). A comprehensive review on synthetic insecticides: toxicity to pollinators, associated risk to food security, and management approaches. *Journal of Biosystems Engineering* 46(3): 254–272. <https://doi.org/10.1007/S42853-021-00104-Y>
- Champion, H.G. & S. Seth (1968). *A Revised Survey of The Forest Types of India*. Manager of Publications, New Delhi, India, 404 pp.
- Devi, R., P. Kumar & V.K. Mattu (2023). An assessment of diversity patterns of butterfly fauna (Lepidoptera: Papilionoidea) from subalpine zone of Western Himalaya. *Oriental Insects* 57(4): 1084–1101. <https://doi.org/10.1080/00305316.2023.2186507>
- Dewan, S., I.K. Chettri, A.H.S. Limboo & B.K. Acharya (2024). Butterflies of the Indian Himalaya Along with Nepal and Bhutan, pp. 271–292. In: Pullaiah, T. (ed.). *Biodiversity Hotspot of the Himalaya*. Apple Academic Press, 538 pp. <https://doi.org/10.1201/9781003455202-11>
- Ghazoul, J. (2006). Floral diversity and the facilitation of pollination. JSTOR. <https://www.jstor.org/stable/3599633>. Accessed on 4.v.2025.
- Hill, G.M., A.Y. Kawahara, J.C. Daniels, C.C. Bateman & B.R. Scheffers (2021). Climate change effects on animal ecology: butterflies and moths as a case study. *Biological Reviews* 96(5): 2113–2126. <https://doi.org/10.1111/BRV.12746>
- Jaryan, V., S.K. Uniyal, R.C. Gupta & R.D. Singh (2013). Alien flora of Indian himalayan state of Himachal Pradesh. *Environmental Monitoring and Assessment* 185: 6129–6153.
- Kehimkar, I. (2008). *The Book of Indian Butterflies*. Bombay Natural History Society, Oxford University, Delhi Press, 497 pp.
- Kehimkar, I. (2016). *The Book of Indian Butterflies*. Bombay Natural History Society, Oxford University Press, Mumbai.
- Kubelková, K. (2024). The effect of pesticides on ecology and communities of butterflies (Lepidoptera) as non-target organisms. Bachelor's Thesis, Faculty of Science, Charles University, Prague, Czech Republic, 33 pp.
- Kumar, S., R.S. Singh, P. Singh & S. Kumar (2019). Rediscovery of butterflies *Arhopala bazalus* Hewitson, 1862 and *Catapaecilma major* Druce, 1895 from Uttarakhand, India. *Journal of Entomology and Zoology Studies* 7(2): 864–867.

- Kunte, K. D.N. Basu & G.G. Kumar (2019). Taxonomy, systematics, and biology of Indian butterflies in the 21st Century, pp. 275–304. In: Ramani, S., P. Mohanraj & H.M. Yeshwanth (eds.). *Indian Insect Diversity and Science*. CRC Press, Florida, USA, 472 pp. <https://doi.org/10.1201/9780429061400>
- Lochan, R., A. Kumar & S. Dewan (2022). First record of *Epicopeia polydora* Westwood, 1841 (Lepidoptera: Epicopeiidae) — a rare day flying moth from northwestern Himalaya, India. *The Journal of the Lepidopterists' Society* 76(2): 155–157.
- Mani, M.S. (1974). *Ecology and Biogeography in India*. Springer Netherlands, Dordrecht, 725 pp.
- Parmesan, C. (2003). *Butterflies as bioindicators for climate change effects*, pp. 541–560. In: Boggs, C.L., Watt, W.B. & Ehrlich, P.R. (eds.). *Butterflies: Ecology and Evolution Taking Flight*. University of Chicago Press, Chicago, 739 pp.
- Sharma, K., B.K. Acharya, G. Sharma, D. Valente, M.R. Pasimeni, I. Petrosillo & T. Selvan (2020). Land use effect on butterfly alpha and beta diversity in the eastern Himalaya, India. *Ecological Indicators* 110: 105605. <https://doi.org/10.1016/j.ecoliind.2019.105605>
- Sharma, N., M.D. Behera, A.P. Das & R.M. Panda (2019). Plant richness pattern in an elevation gradient in the eastern Himalaya. *Biodiversity and Conservation* 28: 2085–2104. <https://doi.org/10.1007/s10531-019-01699-7>
- Singh, A.P. & S. Sondhi (2016). Butterflies of Garhwal, Uttarakhand, western Himalaya, India. *Journal of Threatened Taxa* 8(4): 8666–8697. <https://doi.org/10.11609/jott.2254.8.4.8666-8697>
- Smetacek, P. (2011). Review of Indian Lepidoptera collections and their significance in conservation. *ENVIS Bulletin: Arthropods and their conservation in India (Insects & Spiders)* 14(1): 135–139.
- Singh, A.P. (2009). Butterflies of Kedarnath Musk Deer Reserve, Garhwal Himalaya, India. *Journal of Threatened Taxa* 1(1): 37–48. <https://doi.org/10.11609/jott.01873.37-48>
- Sondhi, S. & K. Kunte (2018). *Butterflies of Uttarakhand: A Field Guide*. Bishen Singh Mahendra Pal Singh, Dehradun, India, 310 pp.
- Stattersfield, A.J. (1998). Identifying threatened species in the “south” using new criteria. *Pacific Conservation Biology* 4(1): 33–38.
- Uniyal, S.K. & R.D. Singh (2013). Vegetation characteristics, floral diversity and resource use in Western Himalayas, pp. 162–179. In: Chopra, V.L. (ed.). *Climate Change and its Ecological Implications for the Western Himalaya*. Scientific Publishers, Jodhpur, India, 406 pp.
- Uniyal, V.P. (2004). Butterflies of Nanda Devi National Park— a world heritage site. *Indian Forester* 130: 800–803.
- Uniyal, V.P., M. Bhardwaj & A.K. Sanyal (2013). An Assessment of Entomofauna for Management and Conservation of Biodiversity in the Gangotri Landscape. Annual Progress Report, Wildlife Institute of India, Dehradun, 237 pp.
- Vázquez, D.P. (1998). Endemic bird areas of the world—Priorities for biodiversity conservation. *Cir.Nii.Ac.Jp.* <https://cir.nii.ac.jp/crid/1573105975027777280>. Accessed on 06.iv.2025.
- Wani, R.F.C. & I.M. Shah (2024). Impact of Environmental Pollution on Diversity of Insects: A Case Study of Some Major Insect Orders, pp. 17–53. In: Hajam, Y.A., S.H. Parey & R.A. Bhat (eds.). *Insect Diversity and Ecosystem Services, Volume 2: Environmental Indicators, Molecular Approaches, and Management Strategies*. Apple Academic Press, Florida, USA, 268 pp.

Mr. Jatishwor Singh Irungbam, Biology Centre CAS, Branišovská, Czech Republic.
Dr. Ian J. Kitching, Natural History Museum, Cromwell Road, UK
Dr. George Mathew, Kerala Forest Research Institute, Peechi, India
Dr. John Noyes, Natural History Museum, London, UK
Dr. Albert G. Orr, Griffith University, Nathan, Australia
Dr. Sameer Padhye, Katholieke Universiteit Leuven, Belgium
Dr. Nancy van der Poorten, Toronto, Canada
Dr. Kareen Schnabel, NIWA, Wellington, New Zealand
Dr. R.M. Sharma, (Retd.) Scientist, Zoological Survey of India, Pune, India
Dr. Manju Siliwal, WILD, Coimbatore, Tamil Nadu, India
Dr. G.P. Sinha, Botanical Survey of India, Allahabad, India
Dr. K.A. Subramanian, Zoological Survey of India, New Alipore, Kolkata, India
Dr. P.M. Sureshan, Zoological Survey of India, Kozhikode, Kerala, India
Dr. R. Varatharajan, Manipur University, Imphal, Manipur, India
Dr. Eduard Vives, Museu de Ciències Naturals de Barcelona, Terrassa, Spain
Dr. James Young, Hong Kong Lepidopterists' Society, Hong Kong
Dr. R. Sundararaj, Institute of Wood Science & Technology, Bengaluru, India
Dr. M. Nithyanandan, Environmental Department, La Ala Al Kuwait Real Estate. Co. K.S.C., Kuwait
Dr. Himender Bharti, Punjabi University, Punjab, India
Mr. Purnendu Roy, London, UK
Mr. Saito Motoki, The Butterfly Society of Japan, Tokyo, Japan
Dr. Sanjay Sondhi, TITLI TRUST, Kalpavriksh, Dehradun, India
Dr. Nguyen Thi Phuong Lien, Vietnam Academy of Science and Technology, Hanoi, Vietnam
Dr. Nitin Kulkarni, Tropical Research Institute, Jabalpur, India
Dr. Robin Wen Jiang Ngiam, National Parks Board, Singapore
Dr. Lionel Monod, Natural History Museum of Geneva, Genève, Switzerland.
Dr. Asheesh Shivam, Nehru Gram Bharti University, Allahabad, India
Dr. Rosana Moreira da Rocha, Universidade Federal do Paraná, Curitiba, Brasil
Dr. Kurt R. Arnold, North Dakota State University, Saxony, Germany
Dr. James M. Carpenter, American Museum of Natural History, New York, USA
Dr. David M. Claborn, Missouri State University, Springfield, USA
Dr. Kareen Schnabel, Marine Biologist, Wellington, New Zealand
Dr. Amazonas Chagas Júnior, Universidade Federal de Mato Grosso, Cuiabá, Brasil
Mr. Monsoon Jyoti Gogoi, Assam University, Silchar, Assam, India
Dr. Heo Chong Chin, Universiti Teknologi MARA (UiTM), Selangor, Malaysia
Dr. R.J. Shiel, University of Adelaide, SA 5005, Australia
Dr. Siddharth Kulkarni, The George Washington University, Washington, USA
Dr. Priyadarsanan Dharma Rajan, ATREE, Bengaluru, India
Dr. Phil Alderslade, CSIRO Marine And Atmospheric Research, Hobart, Australia
Dr. John E.N. Veron, Coral Reef Research, Townsville, Australia
Dr. Daniel Whitmore, State Museum of Natural History Stuttgart, Rosenstein, Germany.
Dr. Yu-Feng Hsu, National Taiwan Normal University, Taipei City, Taiwan
Dr. Keith V. Wolfe, Antioch, California, USA
Dr. Siddharth Kulkarni, The Hormiga Lab, The George Washington University, Washington, D.C., USA
Dr. Tomas Ditrich, Faculty of Education, University of South Bohemia in Ceske Budejovice, Czech Republic
Dr. Mihaly Foldvari, Natural History Museum, University of Oslo, Norway
Dr. V.P. Uniyal, Wildlife Institute of India, Dehradun, Uttarakhand 248001, India
Dr. John T.D. Caleb, Zoological Survey of India, Kolkata, West Bengal, India
Dr. Priyadarsanan Dharma Rajan, Ashoka Trust for Research in Ecology and the Environment (ATREE), Royal Enclave, Bangalore, Karnataka, India

Fishes

Dr. Topiltzin Contreras MacBeath, Universidad Autónoma del estado de Morelos, México
Dr. Heok Hee Ng, National University of Singapore, Science Drive, Singapore
Dr. Rajeev Raghavan, St. Albert's College, Kochi, Kerala, India
Dr. Robert D. Sluka, Chiltern Gateway Project, A Rocha UK, Southall, Middlesex, UK
Dr. E. Vivekanandan, Central Marine Fisheries Research Institute, Chennai, India
Dr. Davor Zanella, University of Zagreb, Zagreb, Croatia
Dr. A. Biju Kumar, University of Kerala, Thiruvananthapuram, Kerala, India
Dr. Akhilesh K.V., ICAR-Central Marine Fisheries Research Institute, Mumbai Research Centre, Mumbai, Maharashtra, India
Dr. J.A. Johnson, Wildlife Institute of India, Dehradun, Uttarakhand, India
Dr. R. Ravinesh, Gujarat Institute of Desert Ecology, Gujarat, India

Amphibians

Dr. Sushil K. Dutta, Indian Institute of Science, Bengaluru, Karnataka, India
Dr. Annemarie Ohler, Muséum national d'Histoire naturelle, Paris, France

Reptiles

Dr. Gernot Vogel, Heidelberg, Germany
Dr. Raju Vyas, Vadodara, Gujarat, India
Dr. Pritpal S. Soorae, Environment Agency, Abu Dhabi, UAE.
Prof. Dr. Wayne J. Fuller, Near East University, Mersin, Turkey
Prof. Chandrashekher U. Rivonker, Goa University, Taleigao Plateau, Goa. India
Dr. S.R. Ganesh, Kalinga Foundation, Agumbe, India.
Dr. Himansu Sekhar Das, Terrestrial & Marine Biodiversity, Abu Dhabi, UAE

Birds

Dr. Hem Sagar Baral, Charles Sturt University, NSW Australia
Mr. H. Byju, Coimbatore, Tamil Nadu, India
Dr. Chris Bowden, Royal Society for the Protection of Birds, Sandy, UK
Dr. Priya Davidar, Pondicherry University, Kalapet, Puducherry, India
Dr. J.W. Duckworth, IUCN SSC, Bath, UK
Dr. Rajah Jayapal, SAGON, Coimbatore, Tamil Nadu, India
Dr. Rajiv S. Kalsi, M.L.N. College, Yamuna Nagar, Haryana, India
Dr. V. Santharam, Rishi Valley Education Centre, Chittoor Dt., Andhra Pradesh, India
Dr. S. Balachandran, Bombay Natural History Society, Mumbai, India
Mr. J. Praveen, Bengaluru, India
Dr. C. Srinivasulu, Osmania University, Hyderabad, India
Dr. K.S. Gopi Sundar, International Crane Foundation, Baraboo, USA
Dr. Gombobaatar Sunde, Professor of Ornithology, Ulaanbaatar, Mongolia
Prof. Reuven Yosef, International Birding & Research Centre, Eilat, Israel
Dr. Taej Mundkur, Wetlands International, Wageningen, The Netherlands
Dr. Carol Inskipp, Bishop Auckland Co., Durham, UK
Dr. Tim Inskipp, Bishop Auckland Co., Durham, UK
Dr. V. Gokula, National College, Tiruchirappalli, Tamil Nadu, India
Dr. Arkady Lelej, Russian Academy of Sciences, Vladivostok, Russia
Dr. Simon Dowell, Science Director, Chester Zoo, UK
Dr. Mário Gabriel Santiago dos Santos, Universidade de Trás-os-Montes e Alto Douro, Quinta de Prados, Vila Real, Portugal
Dr. Grant Connette, Smithsonian Institution, Royal, VA, USA
Dr. P.A. Azeez, Coimbatore, Tamil Nadu, India

Mammals

Dr. Giovanni Amori, CNR - Institute of Ecosystem Studies, Rome, Italy
Dr. Anwaruddin Chowdhury, Guwahati, India
Dr. David Mallon, Zoological Society of London, UK
Dr. Shomita Mukherjee, SAGON, Coimbatore, Tamil Nadu, India
Dr. Angie Appel, Wild Cat Network, Germany
Dr. P.O. Nameer, Kerala Agricultural University, Thrissur, Kerala, India
Dr. Ian Redmond, UNEP Convention on Migratory Species, Lansdown, UK
Dr. Heidi S. Riddle, Riddle's Elephant and Wildlife Sanctuary, Arkansas, USA
Dr. Karin Schwartz, George Mason University, Fairfax, Virginia.
Dr. Lala A.K. Singh, Bhubaneswar, Orissa, India
Dr. Mewa Singh, Mysore University, Mysore, India
Dr. Paul Racey, University of Exeter, Devon, UK
Dr. Honnavalli N. Kumara, SAGON, Anaikatty P.O., Coimbatore, Tamil Nadu, India
Dr. Nishith Dharaiya, HNG University, Patan, Gujarat, India
Dr. Spartaco Gippoliti, Socio Onorario Società Italiana per la Storia della Fauna "Giuseppe Altobello", Rome, Italy
Dr. Justus Joshua, Green Future Foundation, Tiruchirappalli, Tamil Nadu, India
Dr. H. Raghuram, Sri S. Ramasamy Naidu Memorial College, Virudhunagar, Tamil Nadu, India
Dr. Paul Bates, Harison Institute, Kent, UK
Dr. Jim Sanderson, Small Wild Cat Conservation Foundation, Hartford, USA
Dr. Dan Challender, University of Kent, Canterbury, UK
Dr. David Mallon, Manchester Metropolitan University, Derbyshire, UK
Dr. Brian L. Cypher, California State University-Stanislaus, Bakersfield, CA
Dr. S.S. Talmale, Zoological Survey of India, Pune, Maharashtra, India
Prof. Karan Bahadur Shah, Budhanilakantha Municipality, Kathmandu, Nepal
Dr. Susan Cheyne, Borneo Nature Foundation International, Palangkaraja, Indonesia
Dr. Hemanta Kafley, Wildlife Sciences, Tarleton State University, Texas, USA

Other Disciplines

Dr. Aniruddha Belsare, Columbia MO 65203, USA (Veterinary)
Dr. Mandar S. Paingankar, University of Pune, Pune, Maharashtra, India (Molecular)
Dr. Jack Tordoff, Critical Ecosystem Partnership Fund, Arlington, USA (Communities)
Dr. Ulrike Streicher, University of Oregon, Eugene, USA (Veterinary)
Dr. Hari Balasubramanian, EcoAdvisors, Nova Scotia, Canada (Communities)
Dr. Rayanna Hellem Santos Bezerra, Universidade Federal de Sergipe, São Cristóvão, Brazil
Dr. Jamie R. Wood, Landcare Research, Canterbury, New Zealand
Dr. Wendy Collinson-Jonker, Endangered Wildlife Trust, Gauteng, South Africa
Dr. Rajeshkumar G. Jani, Anand Agricultural University, Anand, Gujarat, India
Dr. O.N. Tiwari, Senior Scientist, ICAR-Indian Agricultural Research Institute (IARI), New Delhi, India
Dr. L.D. Singla, Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana, India
Dr. Rupika S. Rajakaruna, University of Peradeniya, Peradeniya, Sri Lanka
Dr. Bahar Baviskar, Wild-CER, Nagpur, Maharashtra 440013, India

Reviewers 2021–2023

Due to pausity of space, the list of reviewers for 2021–2023 is available online.

The opinions expressed by the authors do not reflect the views of the Journal of Threatened Taxa, Wildlife Information Liaison Development Society, Zoo Outreach Organization, or any of the partners. The journal, the publisher, the host, and the partners are not responsible for the accuracy of the political boundaries shown in the maps by the authors.

Print copies of the Journal are available at cost. Write to:
The Managing Editor, JoTT,
c/o Wildlife Information Liaison Development Society,
3A2 Varadarajulu Nagar, FCI Road, Ganapathy, Coimbatore,
Tamil Nadu 641006, India
ravi@threatenedtaxa.org & ravi@zooreach.org

Journal of Threatened Taxa is indexed/abstracted in Bibliography of Systematic Mycology, Biological Abstracts, BIOSIS Previews, CAB Abstracts, EBSCO, Google Scholar, Index Copernicus, Index Fungorum, JournalSeek, National Academy of Agricultural Sciences, NewJour, OCLC WorldCat, SCOPUS, Stanford University Libraries, Virtual Library of Biology, Zoological Records.

NAAS rating (India) 5.64



www.threatenedtaxa.org

OPEN ACCESS



The Journal of Threatened Taxa (JoTT) is dedicated to building evidence for conservation globally by publishing peer-reviewed articles online every month at a reasonably rapid rate at www.threatenedtaxa.org. All articles published in JoTT are registered under [Creative Commons Attribution 4.0 International License](https://creativecommons.org/licenses/by/4.0/) unless otherwise mentioned. JoTT allows unrestricted use, reproduction, and distribution of articles in any medium by providing adequate credit to the author(s) and the source of publication.

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

July 2026 | Vol. 18 | No. 7 | Pages: 29159–29374

Date of Publication: 26 July 2026 (Online & Print)

DOI: 10.11609/jott.2026.18.7.29159-29374

Articles

The need for rigorous peer-review of Environmental Impact Assessments: a case from the Western Ghats, India

– Malaika Mathew Chawla, Sinead D'Silva, Madhushri Mudke, Anushka Rege, Nisha Bhakat, Nandini Velho, Vidyadhar Atkore, R. Sahanashree, Jerusha D'Souza, Aparna Kolekar, Anuja Date, Anish Paul, Aayush Gupta, Karthik Teegalapalli, Giridhar Kulkarni, Pronoy Baidya, Ajinkya Bagal, Katrina Fernandez, Omkar Dharwadkar & Parag Rangnekar, Pp. 29159–29180

Regional, ecological and biodiversity context of the Kashmir Valley, northwestern Himalaya, India

– Mohsin Javid, Khurshed Ahmad, Orus Ilyas, Junid N. Shah & Affiullah Khan, Pp. 29181–29195

Metabarcoding-based diet characterization of the Kolar Roundleaf Bat *Hipposideros hypophyllus* Kock & Bhat, 1994 (Chiroptera: Hipposideridae) and its peninsular Indian congeners

– Bhargavi Srinivasulu, Aditya Srinivasulu & Chelmala Srinivasulu, Pp. 29196–29211

A decadal study on the waterbirds and an analysis of the declining species in Perur-Sundakamuthur Lake, Coimbatore, Tamil Nadu, India

– G. Parameswaran, R. Sivashankar & R. Vridhi, Pp. 29212–29225

Diversity and habitat associations of avifauna in the Poovar Estuary, Kerala, India

– B.S. Bipitha, V. Reshmi, H. Maitreyi & H. Byju, Pp. 29226–29237

Abyssinian Blue-winged Goose *Cyanochen cyanoptera* Rüppell, 1845 population size, distribution, and habitat association in the central-south highlands of Ethiopia

– Solomon Mengistu & Afework Bekele, Pp. 29238–29250

Foraging postures and techniques used by the White-bellied Heron *Ardea insignis* Hume, 1878 (Aves: Pelecaniformes: Ardeidae) in Namdapha Tiger Reserve, India

– Himadri Sekhar Mondal & Gopinathan Maheswaran, Pp. 29251–29260

Breeding ecology and nest-site characteristics of the Black-necked Stork *Ephippiorhynchus asiaticus* in Khijadiya Bird Sanctuary, a Ramsar Wetland of Gujarat, India

– Sandeep Munjpara, Divyrajsinh Jadeja, Nita Solanki, Amitkumar Nayak & B.P. Pati, Pp. 29261–29268

An updated checklist and new records of butterfly species in Kedarnath Musk Deer Sanctuary (western Himalaya), Uttarakhand, India

– Anand Kumar, Priyanshu Kumar, Gourav Lochan, Prachi Arya & Rajeev Lochan, Pp. 29269–29286

Abundance, habitat preference, and ethnobiological assessment of the invasive Golden Apple Snail *Pomacea canaliculata* (Lamarck, 1822) in selected rice fields in Lanao del Sur, Philippines

– Ashiah M. Dimalutang, Mohammad Al-Thanie U. Paudac, Jonald C. Bornaes, Rosabeth M. Macapil, Mayleen P. Malagamba & Naima R. Sirad, Pp. 29287–29301

An annotated checklist of bryophytes of Rajouri District, Jammu & Kashmir, India

– Manju Sharma, Nazia Kouser, P.L. Uniyal & Shreekar Pant, Pp. 29302–29313

Communications

First successful post-release breeding of captive-bred White-rumped Vultures *Gyps bengalensis* (Accipitriformes: Accipitridae) in the wild at Buxa Tiger Reserve, India

– Soumya Sundar Chakraborty, Debal Ray, Apurba Sen, P.J. Harikrishnan & Nabi Kanta Jha, Pp. 29314–29321

A checklist of the avifauna of the Noakhali Science and Technology University campus, Noakhali, Bangladesh

– Ashikur Rahman Jibon, Tanzina Alam & M. Rakibur Rahman, Pp. 29322–29330

Record of the crambid moth *Aethaloessa calidalis* (Guenée, 1854) (Lepidoptera: Crambidae: Spilomelinae) from Chhattisgarh, India

– Akanksha Chandrakar & Shashi Gupta, Pp. 29331–29335

Short Communications

First photographic record of the Northern Swamp Deer *Rucervus duvaucelii* *duvaucelii* in Upper Ganga River Ramsar Site, India

– Aftab Alam Usmani, Pichaimuthu Gangaamaran, Ruchi Badola & Syed Ainul Hussain, Pp. 29336–29339

First image-based evidence of Wroughton's Free-tailed Bat *Otomops wroughtoni* (Thomas, 1913) (Chiroptera: Molossidae) from the Yamuna Floodplain, New Delhi, India

– Umendra Sirohi, Mohan Singh, M. Faisal, Ekta Khurana, Sumit Dookia & Faiyaz A. Khudsar, Pp. 29340–29344

New distribution record of *Hydrocotyle bonariensis* Lam. (Magnoliopsida: Apiales: Araliaceae) from India

– Balasiewdor Kharsyntiew, H.T. Lalmuankima, Vijay, Poonam Sharma & Rambir Singh, Pp. 29345–29349

Recorded and lost: *Methles indicus* Régimbart, 1899 (Coleoptera: Dytiscidae) a new distribution record from the state of Telangana: a case study on habitat loss due to urban encroachment

– Shiva Shankar, Deepa Jaiswal & Devadoss Kumar, Pp. 29350–29353

Notes

Camera-trap record of the Indian Grey Wolf *Canis lupus pallipes* (Sykes, 1831) (Mammalia: Carnivora: Canidae) from Karlapat Wildlife Sanctuary, Odisha, India

– Siddhanta Kumar Mohanta & R. Kalaivanan, Pp. 29354–29356

Decline in winter visiting Common Kestrel *Falco tinnunculus* (Falconiformes: Falconidae) at Rani, Assam 2011–2024

– Sachin Ranade, Pp. 29357–29359

Coprophagy in Egyptian Vulture *Neophron percnopterus* (Accipitriformes: Accipitridae) at Jorbeer carcass dump, Rajasthan

– Sachin Ranade & Hemant Bajpai, Pp. 29360–29363

New record of cob-web spider species *Steatoda albomaculata* (De Geer, 1778) (Araneae: Theridiidae) from Kachchh, India with detailed distribution of Indian species of *Steatoda* Sundevall, 1833

– Subhash I. Parmar, Vivek U. Chauhan, Ketankumar Yogi & Pranav J. Pandya, Pp. 29364–29366

Predation record of the hornet *Vespa basalis* Smith, 1852 (Hymenoptera: Vespidae) by the orb-weaver spider *Nephila pilipes* (Fabricius, 1793) (Araneae: Araneidae)

– Shantam Ojha & Gautam, Pp. 29367–29369

Notes on the occurrence of southeastern Asian taxon *Scopellaria marginata* (Blume) W.J.de Wilde & Duyfjes (Cucurbitaceae) in the Nicobar Islands: a new distribution record in the Indian part of Sundaland

– K. Pradheep, K. Joseph John, I. Jaisankar & P.K. Singh, Pp. 29370–29374

Publisher & Host



Threatened Taxa