OPEN ACCESS



The Journal of Threatened Taxa 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 unless otherwise mentioned. JoTT allows unrestricted use of articles in any medium, reproduction, and distribution by providing adequate credit to the authors and the source of publication.



Journal of Threatened Taxa

Building evidence for conservation globally

www.threatenedtaxa.org ISSN 0974-7907 (Online) | ISSN 0974-7893 (Print)

NOTE

A CHECKLIST OF BUTTERFLIES (INSECTA: LEPIDOPTERA) FROM TALEIGAO PLATEAU, GOA, INDIA

Dipak Bowalkar, Nadar Anal Gracy Michael, Kiran Gaude & I.K. Pai

26 August 2017 | Vol. 9| No. 8 | Pp. 10626-10630 10.11609/jott.2687.9.8.10626-10630



For Focus, Scope, Aims, Policies and Guidelines visit http://threatenedtaxa.org/About JoTT For Article Submission Guidelines visit http://threatenedtaxa.org/Submission Guidelines For Policies against Scientific Misconduct visit http://threatenedtaxa.org/JoTT_Policy_against_Scientific_Misconduct For reprints contact <info@threatenedtaxa.org>

Partner



Publisher/Host



Journal of Threatened Taxa | www.threatenedtaxa.org | 26 August 2017 | 9(8): 10626–10630



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

OPEN ACCESS



Plateaus are characteristic features of Goa (Alvares 2002). They are intermediate areas between the Western Ghats and the coastal plains and are known to harbor endemic plants of the Western Ghats (Joshi & Janarthanam 2004). The most prominent plateaus in Goa are Pernem, Mopa, Morgim, Assonora, Ponda, Kundaim, Betul,

Sanvordem and Quepem. Plateaus are often considered as barren lands and hence they were the natural choice for setting up developmental projects (Alvares 2002; Desai & Shanbhag 2012). Taleigao plateau (Fig. 1) is not an exception to this and several state institutions, hostels and residential areas have been set up in this area. It covers an area of about 296ha with moist deciduous forest mixed with evergreen species, scrub jungle and lateritic vegetation and is surrounded by sloping valleys and alluvial plains of two rivers-Mandovi in the north and Zuari in the south (Desai & Shanbhag 2012). This plateau encompasses Goa University campus spanning an area of 173ha, residential buildings and Dr. Shyama Prasad Mukherjee Indoor Stadium. With regards to the biodiversity of Taleigao plateau, the flora (Joshi & Janarthanam 2004) and avifauna (Shanbhag & Gramopadhye 1993; Shyama & Gowthaman 1995; Desai & Shanbhag 2012) is well documented.

Gaonkar (1996) documented 251 species from the state. Subsequently, Pai & Mehndiratta (2001) have documented 52 species. Later Borkar & Komarpant (2004) reported 97 butterfly species from Bondla Wildlife Sanctuary. Recently, Gaude & Janarthanam (2015) reported 33 butterfly species from four sacred groves of Goa, viz., Nirankarachi Rai, Alvatinichi Rai, Mharinginichi Rai and Azobachi Rai. Rangnekar (2007)

A CHECKLIST OF BUTTERFLIES (INSECTA: LEPIDOPTERA) FROM TALEIGAO PLATEAU, GOA, INDIA

Dipak Bowalkar¹, Nadar Anal Gracy Michael², Kiran Gaude³ & I.K. Pai⁴

^{1,2,3,4} Department of Zoology, Goa University, Taleigao Plateau, Goa 403206, India ¹dipakbowalkar@gmail.com, ²gracymichael59@gmail.com, ³kiran.gaude@gmail.com (corresponding author), ⁴ikpai@unigoa.ac.in

in his photographic guide dealt with common butterfly species of Goa, though he did not mention the total number of species. Recently Rangnekar & Dharwadkar (2009) reported three new butterfly species, Black-Vein Sergeant *Athyma ranga* Moore, White-banded Awl *Hasora taminatus* (Hubner) and Coon *Psolos fuligo* (Mabille), making a total of 254 species to the butterfly fauna of Goa. However, there is hardly any report of butterfly diversity from this regions. It was in this context that the present work was undertaken.

Field investigations at Taleigao plateau (Fig. 1) at 15.4588333 N & 073.8340556 E carried out from June 2014 to July 2015. During the study period Sunday mornings between 07:00–10:30 hr were utilized for the study purpose. The butterflies were documented by direct observation, random walks and opportunistic sightings (Murugesan et al. 2013). Visually encountered butterflies were identified on the field using photographic guides of Rangnekar (2007) and Kehimkar (2008).

A total of 98 species belonging to 72 genera were recorded (Table 1), which constitutes about 39% of the known butterfly fauna for the state. This includes 34 species of Nymphalidae, followed by Lycaenidae (25

DOI: http://doi.org/10.11609/jott.2687.9.8.10626-10630 | ZooBank: urn:lsid:zoobank.org:pub:595ECA1F-FF9A-40F2-9472-39E9AB90C5BC

Editor: George Mathew, Kerala Forest Research Institute, Peechi, India.

Date of publication: 26 August 2017 (online & print)

Manuscript details: Ms # 2687 | Received 01 February 2017 | Final received 27 June 2017 | Finally accepted 03 August 2017

Citation: Bowalkar, D., N.A.G. Michael, K. Gaude & I.K. Pai (2017). A checklist of butterflies (Insecta: Lepidoptera) from Taleigao plateau, Goa, India. Journal of Threatened Taxa 9(8): 10626–10630; http://doi.org/10.11609/jott.2687.9.8.10626-10630

Copyright: © Bowalkar et al. 2017. Creative Commons Attribution 4.0 International License. JoTT allows unrestricted use of this article in any medium, reproduction and distribution by providing adequate credit to the authors and the source of publication.

Funding: None.

Competing interests: The authors declare no competing interests.

Acknowledgements: Authors are thankful to Department of Zoology, Goa University for providing necessary facilities.



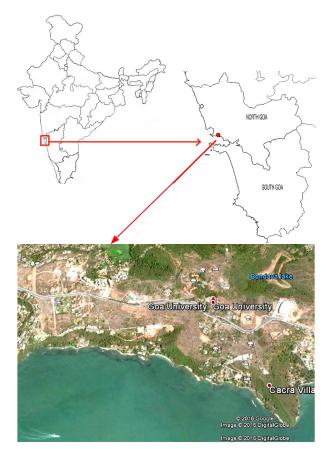


Figure 1. Study Area - Taleigao Plateau

species), Hesperiidae (16 species), Pieridae (13 species), and Papilionidae with 11 species. Of the 98 butterfly species, two species, the Malabar-banded Peacock Papilio buddha (Image 1e) and the Southern Birdwing Troides minos (Image 1h) are endemic to the Western Ghats and 10 species, viz., Southern Birdwing, Crimson Rose Altrophaneura hector (Image 1d), Common Pierrot Castalius rosimon (Image g), Danied Eggfly Hypolimnas misippus, Pea Blue Lampides boeticus, Gram Blue Euchrysops cnejus (Image 1f), Common Cerulean Jamides celeno, Common Wanderer Pareronia valeria (Image 1c), Common Gull Cepora nerissa (Image 1b), Common Crow Euploea core (Image 1a) are protected under the Indian Wildlife (Protection) Act (1972). Of these, Troides minos, Altrophaneura hector, Castalius rosimon, Hypolimnas misippus have been placed as Schedule I; Lampides boeticus, (Euchrysops cnejus), Jamides celeno, Pareronia valeria, and Cepora nerisa in Schedule II and *Euploea core* under Schedule III species.

Family Nymphalidae was the most dominant among the families reported. Availability of larval host plants and adult nectar plants could be one of the reasons for its dominancy (Murugesan et al. 2013). Different authors Bowalkar et al.

in their respective studies observed a similar pattern of dominance (Kunte 1997; Kunte et al. 1999; Eswaran & Pramod 2005; Dolia et al. 2008; Krishnakumar et al. 2008; Gaude & Janarthanam 2015). Plateaus in Goa are known for their rich floral diversity (Joshi & Janarthanam 2004). In the present study, family Lycaenidae was the second largest family, with 25 butterfly species; Nimbalkar et al. (2011) got similar results. It is known that members of Lycaenidae largely feed on grasses (Nimbalkar et al. 2011) and the vegetation of Taleigao Plateau is also dominated by herbs, shrubs and rough grass species interspersed with trees. At the study site grass species persist from June to late December, hence it could be a good host for the members of the Lycaenidae family. This is followed by the family Hesperiidae with 16 species. This clearly indicates the importance of the plateaus for the members of the family Hesperiidae. This plateau is infested with invasive plant species such as Chromolaena odorata, i.e., known for its high nectar production (Laxmi & Raju 2011) and Lantana camara that flowers throughout the year and is a good source of nectar for butterflies (Day et al. 2003), which could be some of the reasons for the wide assemblage of butterfly species.

Findings of the present study underline the importance of Taleigao plateau as a preferred habitat for butterflies. The presence of endemic and schedule butterfly species, viz., Papilio Buddha, Troides minos, Altrophaneura hector, Castalius rosimon, Hypolimnas misippus, Lampides boeticus, Euchrysops cnejus, Jamides celeno, Pareronia valeria, Cepora nerissa, Euploea core also indicates the importance of this plateau for butterflies. The management of landscape, as well as of their food plants, may help to maintain and increase the butterfly diversity on the plateau. In the present scenario, plateau after plateau has been encroached upon for various mega projects, which doesn't bode well for conservation of biodiversity of these unique habitats. It is imperative to carry out systematic studies on the flora and fauna on a number of plateaus in the region, identify them as protected sites, such that, these plateaus with grassland patches can be conserved.

References

Alvares, C. (2002). Fish Curry Rice. The Goa Foundation, 376pp.

- Borkar, M.R. & N. Komarpant (2004). Diversity, abundance and habitat associations of butterfly species in Bondla Wildlife Sanctuary of Goa, India. Zoos' Print Journal 19(10): 1648–1653; http://doi. org/10.11609/JoTT.ZPJ.1192.1648-53
- Day, M.D., C.J. Wiley, J. Playford & M.P. Zalucki (2003). Lantana: Current Management, Status and Future Prospects. Australian Centre for International Agricultural Research 5: 1–20.

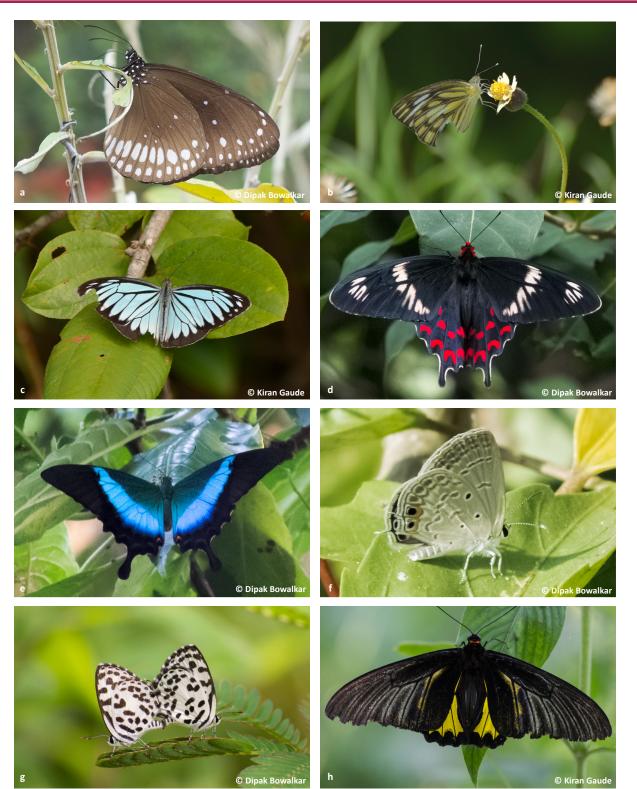


Image 1 a–h. (a) Common Crow *Euploea core*; (b) Common Gull *Cepora nerisa*; (c) Common Wanderer *Pareronia valeria*; (d) Crimson Rose *Altrophaneura hector*, (e) Malabar-banded Peacock *Papilio buddha*; (f) Gram Blue *Euchrysops cnejus*; (g) Common Pierrot *Castalius rosimon*; (h) Southern Birdwing *Troides minos*

Table 1. Checklist of butterflies of Taleigao Plateau

| | Common name | Scientific name |
|----|-------------------------------------|---|
| | Family: Papilionidae | |
| | Subfamily: Papilioninae | |
| 1 | Common Blue bottle | Graphium sarpedon (Linnaeus) |
| 2 | Tailed Jay | Graphium agamemnon (Linnaeus) |
| 3 | Common Mime | Chilasa clytia (Linnaeus) |
| 4 | Malabar-banded Peacock [#] | Papilio buddha Westwood |
| 5 | Common Mormon | Papilio polytes Cramer |
| 6 | Red Helen | Papilio helenus Linnaeus |
| 7 | Blue Mormon | Papilio polymnestor Cramer |
| 8 | Lime Butterfly | Papilio demoleus Linnaeus |
| 9 | Common Rose | Atrophaneura aristolochiae (Fabricius) |
| 10 | Crimson Rose | Atrophaneura hector (Linnaeus)* |
| 11 | Southern Birdwing# | Troides minos (Cramer)* |
| | Family: Pieridae | |
| | Subfamily: Coliadinae | |
| 12 | Small Grass Yellow | Eurema brigitta (Cramer) |
| 13 | Common Grass Yellow | Eurema hecabe (Linnaeus) |
| 14 | Spotless Grass Yellow | <i>Eurema ta</i> (Boisduval) |
| 15 | Common Emigrant | Catopsilia pomona (Fabricius) |
| 16 | Mottled Emigrant | Catopsilia pyranthe (Linnaeus) |
| | Subfamily: Pierinae | |
| 17 | Small Salmon Arab | Colotis amata (Fabricius) |
| 18 | Great Orange Tip | Hebomoia glaucippe (Linnaeus) |
| 19 | Dark wanderer | Pareronia ceylanica (C. & R. Felder) |
| 20 | Common Wonderer | Pareronia valeria (Cramer)** |
| 21 | Common Gull | Cepora nerisa (Fabricius)** |
| 22 | Common Jezebel | Delias eucharis (Drury) |
| 23 | Psyche | Leptosia nina (Fabricius) |
| | Family: Lycaenidae | |
| | Subfamily :Miletinae | |
| 24 | Apefly | Spalgis epius (Westwood) |
| | Subfamily : Curetinae | |
| 25 | Indian sunbeam | Curetis thetis (Drury) |
| | Subfamily: Theclinae | |
| 26 | Large Oakblue | Arhopala amantes (Hewitson) |
| 27 | Yamfly | Loxura atymnus (Stoll) |
| 28 | Monkey Puzzle | Rathinda amor (Fabricius) |
| 29 | Common Silverline | Spindasis vulcanus (Fabricius) |
| | Subfamily: Polyommatinae | |
| 30 | Angled pierrot | Caleta caleta Hewitson |
| 31 | Common pierrot | Castalius rosimon (Fabricius)* |
| 32 | Zebra Blue | Leptotes plinius Fabricius |
| 33 | Rounded Pierrot | Tarucus nara Kollar |
| 34 | Common Cerulean | Jamides celeno (Cramer)** |

| | 1 | |
|----|--------------------------------|---|
| | Common name | Scientific name |
| 35 | Forget me not | Catochrysops strabo (Fabricius) |
| 36 | Pea Blue | Lampides boeticus (Linnaeus)** |
| 37 | Dark Grass Blue | Zizeeria karsandra (Moore) |
| 38 | Pale Grass Blue | Pseudozizeeria maha (Kollar) |
| 39 | Lesser Grass Blue | Zizina otis (Fabricius) |
| 40 | Tiny grass blue | Zizula hylax (Fabricius) |
| 41 | Indian Cupid | Everes lacturnus (Godart) |
| 42 | Red pierrot | Talicada nyseus (Guerin-Meneville) |
| 43 | Quaker | Neopithecops zalmora (Butler) |
| 44 | Common Hudge Blue | Acytolepis puspa (Horsfield) |
| 45 | Gram Blue | Euchrysops cnejus (Fabricius)** |
| 46 | Plains Cupid | Chilades pandava (Horsfield) |
| 47 | Suffused double banded Judy | Abisara bifasciata suffuse (Moore) |
| 48 | Dakhan Common Acacia Blue | Surendra quercetorum biplagiata Butler |
| | Family : Nymphalidae | |
| | Subfamily : Danainae | |
| 49 | Blue Tiger | Tirumala limniace (Cramer) |
| 50 | Dark Blue Tiger | Tirumala septentrionis (Butler) |
| 51 | Stripped Tiger | Danaus gnutia (Cramer) |
| 52 | Plain Tiger | Danaus chrysippus (Linnaeus) |
| 53 | Glassy Tiger | Parantica aglea (Stoll) |
| 54 | Common Crow | Euploea core (Cramer)*** |
| | Subfamily: Charaxinae | |
| 55 | Common Nawab | Polyura athamas (Drury) |
| 56 | Black Raja | Charaxes solon (Fabricius) |
| | Subfamily: Satyrinae | |
| 57 | Common Evening Brown | Melanitis leda (Linnaeus) |
| 58 | Common Treebrown | Lethe rohria (Fabricius) |
| 59 | Common Palmfly | Elymnias hypermnestra (Linnaeus) |
| 60 | Common Bushbrown | Mycalesis perseus (Fabricius) |
| 61 | Dark Banded Bushbrown | Mycalesis mineus (Linnaeus) |
| 62 | Common Four ringed | Ypthima huebneri Kirby |
| | Subfamily: Heliconinae | |
| 63 | Towny Coster | Acraea violae (Fabricius) |
| 64 | Rustic | Cupha erymanthis (Drury) |
| 65 | Common Leopard | Phalanta phalantha (Drury) |
| | SabFaamily: Limenitinae | |
| 66 | Commander | Moduza procris (Cramer) |
| 67 | Common Lascar | Pantoporia hordonia (Stoll) |
| 68 | Common Sailer | Neptis hylas (Linnaeus) |
| 69 | Common Baron | Euthalia aconthea (Cramer) |
| 70 | Grey Count | Tanaecia lepidea (Butler) |
| | Subfamily: Biblidinae | |
| 71 | Angled Castor | Ariadne ariadne (Linnaeus) |

Journal of Threatened Taxa | www.threatenedtaxa.org | 26 August 2017 | 9(8): 10626–10630

| Subfamily: Nymphalinae 73 Painted Lady Vanessa card 74 Blue Pansy Junonia orith 75 Yellow Pansy Junonia iphit 76 Chocolate Pansy Junonia iphit 77 Grey Pansy Junonia athit 78 Lemon Pansy Junonia athit 78 Lemon Pansy Junonia athit 79 Peacock Pansy Junonia athit 80 Great Eggfly Hypolimnas athit 81 Daniad Eggfly Hypolimnas athit 82 Autumn Leaf Doleschallia 83 Common Banded Awl Hasora chronoma athit 84 Brown Awl Badamia excel 85 Common banded redeye Gangara leb 86 Chestnut Bob Lambrix sals | a (Cramer) |
|--|--|
| 73 Painted Lady Vanessa card 74 Blue Pansy Junonia orith 75 Yellow Pansy Junonia hiert 76 Chocolate Pansy Junonia thiert 77 Grey Pansy Junonia atlith 78 Lemon Pansy Junonia lemo 79 Peacock Pansy Junonia almo 80 Great Eggfly Hypolimnas f 81 Daniad Eggfly Hypolimnas f 82 Autumn Leaf Doleschallia 83 Common Banded Awl Hasora chron 84 Brown Awl Badamia exc Subfamily : Hesperiinae Subfamily : Hesperiinae 85 Common banded redeye Gangara leb 86 Chestnut Bob Lambrix sals | niya (Linnaeus) ta (Fabricius) ta (Cramer) |
| 74 Blue Pansy Junonia orith 75 Yellow Pansy Junonia iphit 76 Chocolate Pansy Junonia iphit 77 Grey Pansy Junonia atlitu 78 Lemon Pansy Junonia lemo 79 Peacock Pansy Junonia almo 80 Great Eggfly Hypolimnas 81 Daniad Eggfly Hypolimnas 82 Autumn Leaf Doleschallia 53 Common Banded Awl Hasora chron 84 Brown Awl Badamia exc Subfamily : Hesperiinae Subfamily : Hesperiinae 85 Common banded redeye Gangara leb 86 Chestnut Bob Lambrix sals | niya (Linnaeus) ta (Fabricius) ta (Cramer) |
| 75 Yellow Pansy Junonia hier 76 Chocolate Pansy Junonia iphit 77 Grey Pansy Junonia atlitt 78 Lemon Pansy Junonia atlitt 79 Peacock Pansy Junonia atlitt 80 Great Eggfly Hypolimnas in 81 Daniad Eggfly Hypolimnas in 82 Autumn Leaf Doleschallia Family: Hesperiidae Image: Subfamily :Coeliadinae Image: Subfamily :Hesperiinae 83 Common Banded Awl Hasora chronomic atlitter 84 Brown Awl Badamia excel 85 Common banded redeye Gangara lebb 86 Chestnut Bob Lambrix salse | ta (Fabricius) ta (Cramer) |
| 76 Chocolate Pansy Junonia iphit 77 Grey Pansy Junonia atlitt 78 Lemon Pansy Junonia atlitt 79 Peacock Pansy Junonia almo 80 Great Eggfly Hypolimnas in 81 Daniad Eggfly Hypolimnas in 82 Autumn Leaf Doleschallian 53 Common Banded Awl Hasora chronon 84 Brown Awl Badamia excl Subfamily : Hesperiinae Subfamily : Hesperiinae 85 Common banded redeye Gangara lebb 86 Chestnut Bob Lambrix sals | a (Cramer) |
| 77 Grey Pansy Junonia atlitu 78 Lemon Pansy Junonia lemo 79 Peacock Pansy Junonia almo 80 Great Eggfly Hypolimnas almo 81 Daniad Eggfly Hypolimnas almo 82 Autumn Leaf Doleschallia Family: Hesperiidae Subfamily :Coeliadinae Subfamily almo 83 Common Banded Awl Hasora chron 84 Brown Awl Badamia exc Subfamily : Hesperiinae Subfamily almo 85 Common banded redeye Gangara leb 86 Chestnut Bob Lambrix sals | |
| 78 Lemon Pansy Junonia lemo 79 Peacock Pansy Junonia almo 80 Great Eggfly Hypolimnas almo 81 Daniad Eggfly Hypolimnas almo 82 Autumn Leaf Doleschallia 5 Subfamily :Coeliadinae Subfamily :Coeliadinae 83 Common Banded Awl Hasora chroi 84 Brown Awl Badamia exc Subfamily : Hesperiinae Subfamily : Hesperiinae 85 Common banded redeye Gangara leb 86 Chestnut Bob Lambrix salsa | ec (Linnaous) |
| 79 Peacock Pansy Junonia alma 80 Great Eggfly Hypolimnas in 81 Daniad Eggfly Hypolimnas in 82 Autumn Leaf Doleschallian 83 Subfamily :Coeliadinae Image: Subfamily :Coeliadinae 83 Common Banded Awl Hasora chronon 84 Brown Awl Badamia excl Subfamily : Hesperiinae Image: Subfamily : Hesperiinae 85 Common banded redeye Gangara lebb 86 Chestnut Bob Lambrix sals | es (Linnaeus) |
| 80 Great Eggfly Hypolimnas i 81 Daniad Eggfly Hypolimnas i 82 Autumn Leaf Doleschallia Family: Hesperiidae 83 Common Banded Awl Hasora chronom 84 Brown Awl Badamia excel Subfamily : Hesperiinae 85 Common banded redeye Gangara lebb 86 Chestnut Bob Lambrix salse | onias (Linnaeus) |
| 81 Daniad Eggfly Hypolimnas i 82 Autumn Leaf Doleschallia 82 Family: Hesperiidae Subfamily: Coeliadinae 83 Common Banded Awl Hasora chroit 84 Brown Awl Badamia exc Subfamily : Hesperiinae Subfamily : Hesperiinae 85 Common banded redeye Gangara leb 86 Chestnut Bob Lambrix salse | ana (Linnaeus) |
| 82 Autumn Leaf Doleschallia 82 Autumn Leaf Doleschallia Family: Hesperiidae 83 Common Banded Awl Hasora chron 84 Brown Awl Badamia exc Subfamily : Hesperiinae 85 Common banded redeye Gangara leb 86 Chestnut Bob Lambrix sals | <i>bolina</i> (Linnaeus) |
| Family: Hesperiidae Subfamily :Coeliadinae 83 Common Banded Awl Hasora chron 84 Brown Awl Bubfamily : Hesperiinae 85 Common banded redeye 66 Chestnut Bob | misippus (Linnaeus)* |
| Subfamily :Coeliadinae 83 Common Banded Awl 84 Brown Awl Bufamily : Hesperiinae 85 Common banded redeye 6 Chestnut Bob | bisaltide (Cramer) |
| 83 Common Banded Awl Hasora chron 84 Brown Awl Badamia exc Subfamily : Hesperiinae Subfamily : Hesperiinae 85 Common banded redeye Gangara leb 86 Chestnut Bob Lambrix salse | |
| 84 Brown Awl Badamia exc Subfamily : Hesperiinae | |
| Subfamily : Hesperiinae 85 Common banded redeye 86 Chestnut Bob | mus (Cramer) |
| 85 Common banded redeye Gangara leb 86 Chestnut Bob Lambrix salse | lamationis (Fabricius) |
| 86 Chestnut Bob Lambrix sals | |
| | adea (Hewitson) |
| 87 Giant redeye Gangara thy | ala (Moore) |
| | vrsis (Fabricius) |
| 88 Grass Demon Udaspes folu | us (Cramer) |
| 89 Pygmy Scrub hopper Aeromachus | s pygmaeus (Fabricius) |
| 90 Bush hopper Ampittia dio | scorides (Fabricius) |
| 91 Tamil grass dart Taractrocera | ceramas (Hewitson) |
| 92 Rice Swift Borbo cinnar | ra (Wallace) |
| Subfamily : Pyrginae | |
| 93 Golden Angle Caprona ran. Felder) | sonnetti (C. & R. |
| 94 Fulvous piedflat Pseudocolad | <i>lenia dan</i> (Fabricius) |
| 95 Tricolour Flat Coladenia in | drani (Moore) |
| 96 Common small Flat Tagiades jap | etus (Stoll) |
| 97 Water snow Flat Tagiades litig | aiosa Moschler |
| 98 Indian Skipper Spialia galba | giosa ivioscillei |

* - Schedule I; ** - Schedule II; *** - Schedule III;

[#] - Endemic to the Western Ghats

- Desai, M. & A.B. Shanbhag (2012). An avifaunal case study of a plateau from Goa, India: an eye opener for conservation of plateau ecosystems. *Journal of Threatened Taxa* 4(3): 2444–2453; http:// doi.org/10.11609/JoTT.o2480.2444-53
- Dolia, J., M.S. Devy, N.A. Aravind & A. Kumar (2008). Adult butterfly communities in coffee plantations around a protected area in the Western Ghats, India. *Animal Conservation* 11: 26–34
- Eswaran, R. & P. Pramod (2005). Structure of butterfly community of Anaikatty Hills, Western Ghats. *Zoos' Print Journal* 20(8): 1939– 1942; http://doi.org/10.11609/JoTT.ZPJ.1330.1939-42
- Gaonkar, H. (1996). Butterflies of the Western Ghats, India including Sri Lanka - A Biodiversity Assessment of a Threatened Mountain System. A report submitted to the Centre for Ecological Sciences, Bangalore, India, 86pp.
- Gaude, K. & M.K. Janarthanam (2015). The Butterfly (Insecta: Lepidoptera) diversity of four sacred groves of Goa, India. Journal of Threatened Taxa 7(12): 7927–7932; http://doi.org/10.11609/JoTT. 04228.7927-32
- Joshi, V. & M. Janarthanam (2004). The diversity of lifeform type, habitat preference & phenology of endemics in Goa region of the Western Ghats, India. *Journal of Biogeography* 31: 1227–1237.
- Kehimkar, I. (2008). Textbook of Indian Butterflies. Bombay Natural History Society, 520pp
- Krishnakumar, N., A. Kumaraguru, K. Thiyagesan & S. Asokan (2008). Diversity of Papilonid butterflies in the Indira Gandhi wildlife sanctuary, Western Ghats, southern India. *Tiger Paper* 35: 1–8.
- Kunte, K. (1997). Seasonal patterns in butterfly abundance and species diversity in four tropical habitats in the northern Western Ghats. *Journal of Bioscience* 22(5): 593–603.
- Kunte, K., A. Joglekar, G. Utkarsh, & P. Pramod (1999). Patterns of butterfly, bird and tree diversity in the Western Ghats. *Current Science* 29: 1–14.
- Laxmi, P.V. & A.J.S. Raju (2011). Chromolaena odorata (L.) King & H.E. Robins (Asteraceae), an important nectar source for adult butterflies. *Journal of Threatened Taxa* 3(2): 1542–1547; http://doi. org/10.11609/JoTT.o2504.1542-7
- Murugesan, M., P.R. Arun & B.A.K. Prusty (2013). The butterfly community of an urban wetland system - a case study of Oussudu Bird Sanctuary, Puducherry, India. *Journal of Threatened Taxa* 5(12): 4672–4678; http://doi.org/10.11609/JoTT.o3056.4672-8
- Nimbalkar, R.K., S.K. Chandekar & S.P. Khunte (2011). Butterfly diversity in relation to nectar food plants from Bhor Tahsil, Pune District, Maharashtra, India. *Journal of Threatened Taxa* 3(3): 1601– 1609.
- Pai, I.K. & P. Mehndiratta (2001). Butterfly diversity of Goa, pp. 350– 352. In: Muraleedharan et al. (eds). Advances in Entomology, Special Silver Jubilee issue of Entomon.
- Rangnekar, P. (2007). A Photographic Guide to Butterflies of Goa (also includes butterflies of other ranges of the Western Ghats & Southern India). Mineral Foundation of Goa, 66pp.
- Rangnekar, P. & O. Dharwadkar (2009). Three additions to the known butterfly (Lepidoptera: Rhopalocera and Grypocera) fauna of Goa, India. Journal of Threatened Taxa 1(5): 298–299; http://doi. org/10.11609/JoTT.o2140.298-9
- Shanbhag, A.B. & A. Gramopadhye (1993). Changing ecology of Taleigao Plateau and the bird life in its central zone, the Goa University Campus. *Journal of Karnataka University - Science* 37: 212–222.
- Shyama, S.K. & V. Gowthaman (1995). Birds of Goa University campus. Newsletter for Bird watcher 35(1): 1–2.







OPEN ACCESS The Journal of Threatened Taxa 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 unless otherwise mentioned. JoTT allows unrestricted use of articles in any medium, reproduction, and distribution by providing adequate credit to the authors and the source of publication.

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

August 2017 | Vol. 9 | No. 8 | Pages: 10493–10632 Date of Publication: 26 August 2017 (Online & Print) DOI: 10.11609/jott.2017.9.8.10493-10632

www.threatenedtaxa.org

Article

Floristic diversity of Bhimashankar Wildlife Sanctuary, northern Western Ghats, Maharashtra, India -- Savita Sanjaykumar Rahangdale & Sanjaykumar Ramlal Rahangdale, Pp. 10493-10527

Communications

The ecology and distribution of Flying Foxes (Chiroptera: Pteropodidae: Pteropus) in Tanintharyi Region, Myanmar with a first mainland record of Pteropus hypomelanus geminorum from Myeik -- Khin Swe Oo, Hsu Lae Win, Paul J. J. Bates & Malcolm J. Pearch, Pp. 10528-10537

A reassessment of the avian species diversity in the Eastern Ghats of Tamil Nadu, after the Vernay Survey -- J. Patrick David, R.J. Ranjit Daniels & Vinoth Balasubramanian, Pp. 10538–10550

Angiosperm diversity in Doaba region of Punjab, India -- Kuljinder Kaur, M.C. Sidhu & A.S. Ahluwalia, Pp. 10551-10564

Short Communications

Adventitious rooting of mature Cycas micronesica K.D. Hill (Cycadales: Cycadaceae) tree stems reveals moderate success for salvage of an endangered cycad

-- Thomas Edward Marler & Gil Naputi Cruz, Pp. 10565-10570

A new record of Harlequin Shrimp (Malacostraca: Decapoda: Palaemonidae: Hymenocera picta Dana, 1852) in the southern Mexican Pacific Reefs

-- Omar Valencia-Mendez, Andres Lopez-Perez, Betel Martinez-Guerrero, Virgilio Antonio-Perez & Eduardo Ramirez-Chavez, Pp. 10571-10576

First report of soft coral Sarcophyton birkelandi Verseveldt, 1978 (Anthozoa: Alcyonacea) in Indian waters from Andaman Islands

-- Seepana Rajendra, C. Raghunathan, Tamal Mondal & K. Venkataraman, Pp. 10577-10580

First records of Zinaspa todara distorta de Nicéville, 1887 and Arhopala rama ramosa Evans, 1925 (Lycaenidae: Theclinae) butterflies in Bangladesh -- Tania Khan, Mohammad Quamruzzaman Babu, Mohammad Ashraf Ul Hasan, Tahsinur Rahman Shihan & Prosenjit Debbarma, Pp. 10581–10584

Birds of the Kerala Agricultural University campus, Thrissur District, Kerala, India - an update

-- K. Abha Manohar, Arjun Ramachandran, M.S. Syamili, E.R. Sreekumar, Nithin Mohan, J. Anjali, Abinand Reddy & P.O. Nameer, Pp. 10585-10612

Wintering of the Grey-headed Lapwing Vanellus cinereus (Aves: Charadriiformes: Charadriidae) in Kerala, India -- R. Roshnath, Pp. 10613-10617

Notes

Additional record and conservation measures of Ceropegia odorata Nimmo ex J. Graham from Gujarat State, India -- S.K. Patel, B.L. Punjani, P.R. Desai, V.B. Pandey, Y.S. Chaudhary & P.N. Joshi, Pp. 10618-10622

Records of the Palni Hills Rudraksha Tree Elaeocarpus blascoi (Oxalidales: Elaeocarpaceae) in Palni Hills, Tamil Nadu, India -- Robert Stewart & Tanya Balcar, Pp. 10623–10625

A checklist of butterflies (Insecta: Lepidoptera) from Taleigao Plateau, Goa, India

-- Dipak Bowalkar, Nadar Anal Gracy Michael, Kiran Gaude & I.K. Pai, Pp. 10626-10630

A rare sighting of the Long-tailed Duck Clangula hyemalis (Linnaeus, 1758) (Aves: Anseriformes: Anatidae) over a fourweek period in northwestern India: first detailed scientific documentation in 73 years

-- Pushpinder S. Jamwal, Pankaj Chandan & Rohit Rattan, Pp. 10631-10632



