

Entomological Characterisation of Some of the Butterfly Species of *Papilionidae* from Bastar Division of Chhattisgarh, India

Nisreen Husain¹, Sonia Bajaj², Majid Ali³, Touseef Hussain Trak⁴

¹Department, of Zoology, Govt. Dr. W.W. Patankar Girls' P.G. College, Durg, Chhattisgarh, India

²Department of Zoology, Shri Shankaracharya Mahavidyalaya, Junwani, Bhilai, Chhattisgarh, India

³Department of Zoology, Govt. Digvijay Autonomous P.G. College, Rajnandgaon, Chhattisgarh, India

⁴Department of Botany, Govt. Degree College Kishtwar, Jammu and Kashmir, India

ABSTRACT

One of the most diversified groups of animals, found abundantly, in all types of environment throughout the world is the 'Butterflies'. The study and watching of butterflies perhaps is the second interesting pastime for naturalists, next only to ornithology. They belong to the order 'Lepidoptera', of the phylum 'Arthropoda'. Amongst more than 100 species found in the Bastar division of Chhattisgarh, due to the rich flora and fauna of the region, some of the most common ones belong to the family *Papilionidae*. The present article reviews the entomological characterisation of the five common species of *Papilionidae* butterflies from Bastar division of Chhattisgarh, India.

KEYWORDS: *Butterflies, Wings, Colorful, Mud-puddling, Spots, Streaks*

How to cite this paper: Nisreen Husain | Sonia Bajaj | Majid Ali | Touseef Hussain Trak "Entomological Characterisation of Some of the Butterfly Species of *Papilionidae* from Bastar Division of Chhattisgarh, India"

Published in International Journal of Trend in Scientific Research and Development (ijtsrd), ISSN: 2456-6470, Volume-5 | Issue-4, June 2021, pp.1338-1343, URL: www.ijtsrd.com/papers/ijtsrd43608.pdf



IJTSRD43608

Copyright © 2021 by author (s) and International Journal of Trend in Scientific Research and Development Journal. This is an Open Access article distributed under the terms of the Creative Commons Attribution License (CC BY 4.0) (<http://creativecommons.org/licenses/by/4.0>)



INTRODUCTION

The fluttering butterflies have always been the attracting creatures in all sort of environments, and may be in the parks and gardens or may it be the dense forests and valleys. Butterflies and moths belong to the order 'Lepidoptera'. 'Lepidos' in Greek means 'Scales', and 'Ptera' is for 'Wings'. The Butterflies have scaled wings quite different from the wings of any other insects. It is estimated that there are more than 150, 000 different species of butterflies and moths. Only butterfly species worldwide counts up to 28, 000 species, and the rest being moth. Their day-to-day lives can be characterized by many activities that inspire us human beings to keep energised, and their colorful patterns are soothing to watch. (Gullan *et al.*, 2014; Kwahara *et al.*, 2014; Arun Pratap Singh, 2011, 2017). The order 'Lepidoptera' with scaly winged insects such as 'Butterflies' & 'Moths' consists of mainly two important Superfamilies, *viz.*, Papilionoidea & Hesperioidea. The families included are *Papilionidae*, *Pieridae*, *Nymphalidae* and *Lycaenidae*, as well as *Hesperioidea* respectively. Each of these is enriched with many subfamilies and the members that are recognised with interesting features. (Capinera *et al.*, 2008).

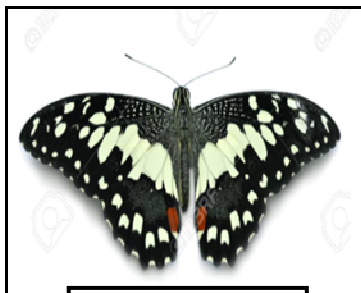
The state, Chhattisgarh took its birth on 1st November, 2000, as a result of bifurcation of the state, Madhya Pradesh, and

since then has contributed a lot to the making of New India. Most of the area of Chhattisgarh is known to occupy the regions of thick vegetation, wide zones forests and land of agriculture. These make the best habitats for diversified wild life and varied insect species. The enormous range of flora and fauna of Chhattisgarh gives it an identity of the state with rich biological diversity. Chhattisgarh is a pride state to have five well known biodiversity representatives as the divisions, *viz.*, Bastar, Surguja, Bilaspur, Raipur and Durg (Chandra *et al.*, 2006; 2000b). Bastar is the main division of Chhattisgarh, a state of Central India. It is well known for its traditional culture, festivals, dense forests and waterfalls. Although it is also a rebellion place for Naxallites, it is famous for its exotic nature, and rich floral and faunal beauty. It possesses a unique blend of tribal and Odia culture, hence often called as the 'Adivasi heart land of India'. Bastar also nests a wide range of wildlife and insects, amongst which it reports the maximum number of butterfly species in Chhattisgarh. The reports show that there are more than 120 species of butterflies belonging to different families in Bastar region. The entomological characterisation of five important species belonging to the family "*Papilionidae*" of Bastar has been attempted in our present

article. Although on Indian graph, this family has more than 100 species of butterfly. (Sharma, 2009 *et al.*,)

1. *Papilio demoleus* (Linnaeus)

It's commonly called "Lime Butterfly", "Swallowtail Butterfly" and 'Chequered Swallowtail', distributed throughout India. The common names refer to their hostplants which are usually citrus species. Unlike most



Photoplate-01

swallow tail butterflies, it does not have a prominent tail. It prefers gardens, hedgerows and open fields. It keeps active throughout the year, flying, fluttering and mud puddling in large numbers along with other butterflies. Usually it appears as tailless black spotted yellow butterfly. In some, the yellow markings turn to deep orange. Wings are broad, with upper forewing with torn red spot and apical black and blue spot. Its size generally varies from 80-100mm.

The butterfly is a regular visitor of flowers, and basks with its wings held wide open on tufts of grass and herbs. It relies on its quick flight for escape, and shows a number of flight modes as per the stages of the day. Research reports showed they have an inborn or spontaneous preference while feeding for blue and purple colors, while the completely neglected colors are yellow and green. (Rafi *et al.*, 1999 a, Arun Drun Pratap, 2011, 2017). **Photoplate-01**

2. *Papilio polymnestor* (Cramer)

It is the "Blue Mormon", and is a large swallowtail butterfly, usually common in evergreen jungles of peninsular India, especially in Bihar, West Bengal, Jharkhand and Sikkim. It is the "State Butterfly" of the Indian state, Maharashtra.



Photoplate-02

These butterflies are commonly seen just after rains, and are the frequent visitors of flowers like Lantana. They prefer forest paths and water. The butterfly is characterised by fast flights hopping and dodging. The male is fond of Sun and avoids the shade. It is not easy to catch them. These butterflies have greater tolerance to other butterflies and humans. They are usually known to visit animal droppings, and are mud puddlers. Blue Mormon has pale blue markings and is tailless. Male have the upper wings rich black with velvety touch. The forewing show pale blue discal band and broad blue streaks. The hind wing has the terminal three-fourths beyond a line crossing the apical third of the cell pale blue. It possesses the superposed postdiscal, sub terminal and terminal series of black spots. Female has red spot at the base of upper forewing. Antennae head, thorax and abdomen are blackish brown. Size usually varies between 120-150mm. (Arun Pratap, 2011, 2014) **Photoplate-02**

3. *Papilio polytes* (Linnaeus)

It is the "Common Mormon", a swallowtail butterfly, seen round the year throughout India. It's of common occurrence from plains up to 2000m and in light wooded country hills. It

is known for the mimicry displayed in various forms. The females usually are known to mimic inedible red bodied swallowtails, such as the common rose and the crimson rose. It is fond of visiting flowers and dung. Also it prefers mud patches, especially the males. They usually are seen to collect on saline soils to extract minerals. Males usually are common visitors to gardens, where they are seen perching together in the evening and basking in sunshine in the morning. It is a restless insect, and flies in rapid zigzag path close to the ground. It prefers to settle down only when it halts to feed. Females are very convincing mimics, especially the flight patterns, similar to those of the rose models. They spend the night settled on vegetation with their wings held open. Size varies from 85-100 mm.



Photoplate-03

Male is entirely black, with pale spots in the middle of upper hind wing, series of pale spots on margins of upper forewing, and the underside of hind wing is marked with red marginal crescents. Female occurs in three forms-

- **Cyrus**-Resembles male but has red marginal crescents on underside of hind wing.
- **Romulus**-Mimics crimson rose, but has indistinct on forewing, and the body is not black.
- **Stichius**-Mimics common rose, but lacks red markings on the body. (Varshney *et al.*, 2015; Savella, 2018) **Photoplate-03**

4. *Graphium agamemnon* (Linnaeus)

It is the "Tailed Jay", found across India, in the plains up to heights of 1800m. It is a predominantly green and black butterfly commonly tracked in forested tracts that receive good rainfall. The butterfly is also called "Tailed Green Jay", "Green Triangle" or "Green Spotted Triangle". It is the restless butterfly, flying from flower to flower, and feeding on nectar. Its peak time of flight is from March to November, hence are active fliers and flutters. They are not often seen drinking from damp patches. Males are known to be found of nectaring from flowers, such as Ixora, Mussaenda and Lantana, whereas the female are known to flutter when looking for food plants or laying eggs.



Photoplate-04

In general, the butterfly is blackish with bright green spots and markings. Two red spots with black crescent mark are found near base. Ternal spot is present on underside of hind wing. Male butterfly is black upper side, with the green markings on the forewing, a spot at the extreme base of the costal margin. Transverse short bar, bands and spots are present. Cilia are very narrow and pale pink. Antennae, head, thorax and abdomen are black, with thorax having the touch of greenish grey and pink. Female similarly, possess a streak of greenish white along the dorsal margin on both upper and

undersides. (Savela, 2018; Ramana *et al.*, 2003) **Photoplate-04**

5. Graphium nomius (Esper)

It is commonly called the “Spot Swordtail”, belonging to the swallowtail family, and native to India, especially Gujarat, and Madhya Pradesh, Uttar Pradesh and Chhattisgarh. It prefers moist deciduous forests, and is seen fluttering



Photoplate-05

between March to June. It is often seen mudpuddling on moist sand, generally in open fields, forests and streams and also found swarming around the flowering plants. It is shy insect and flies fast, especially when disturbed. It prefers basking in hot summers, with wings partially open or completely spread.

Graphium nomius differs from *Graphium antiphates* by being of greater width of the black markings on the upper side. On the hind wing, the black markings of the underside show transparency from below and are represented by black scaling. The size of the butterfly varies from 94-100mm. Male and females are bluish-white upper side. Forewing cell has five broad transverse black bands. Broad black terminal band occupies about 1/3rd of the width of the wing. It is traversed by a transverse sub terminal series of rounded spots of the ground color. Antennae are black, head, thorax and abdomen are creamy white, with a broad longitudinal stripe in the centre. Lateral black stripes are present underneath the abdomen. (Schlaepfor *et al.*, 2006)

Photoplate-05

Discussion & Conclusion

Butterflies being one of the most beautiful and attractive species are considered as the pivot tools in educational media and in context biodiversity. These are the creatures accepted readily in cultures and celebrated aesthetics. Butterflies constitute an important flagship group for advocacy of invertebrates, and are among the mass of animals that dominate our natural world. They are good biological indicators of environmental variation and quality. Their significance is enhanced in the field of education and biodiversity also because of their symbiotic relationship with plant and floral world, as they are dependent upon a variety of plants for larval food and are good pollinators as well. (Kehimkar, 2008; Kunte, 2005).

Besides their intrinsic value, the butterflies also hold great aesthetic value for human kind. Many of the species are iconic and popular, constituting the source of fascination for humans due to their attractive shapes, colors and patterns, and are celebrated in art. Butterflies are fortunate insect to hold places in spiritual literature to poetry and musical lyrics. Butterflies also hold their importance commercially and economically. In some countries, such as Papua New Guinea butterfly farming and breeding are part of the local livelihood. Eco tours bring valuable income to many European countries where people visit each year looking for butterflies and moth. (Arun Pratap, 2011, 2017)

Chhattisgarh as the developing state of biodiversity is reported to be rich in different species of butterflies. Interesting and important species have been reported in the survey work of Chandra *et al.*; 2007. Some of the rare species of Lepidoptera have been a part of remarkable research that gave the state a unique identity (Sharma *et al.*, 2009). A very distinct survey done, district-wise and division-wise, has enabled in forming of inventory of butterfly distribution recorded from Chhattisgarh, India, that is clearly indicated under Indian Wildlife Protection Act, 1972 Schedule status (WPA) as well as New Record to Chhattisgarh (NRC). The surveyed species were reported to belong to the families, *Papilionidae*, *Pieridae*, *Nymphalidae*, *Lycaenidae*, *Hesperiidae*, and their respective subfamilies. (Singh, 1977; Gupta *et al.*, 1987). (Table BB-I)

Although Bastar division has been the richest one in Chhattisgarh to harbour the maximum and diversified species of butterfly (118 species NRC New records to Chhattisgarh), many of them are threatened, nearing the extinction. Destructions of habitats on a massive scale and changing patterns of climate are responsible for the disappearance of these beautiful creatures. The unprecedented environmental change is responsible for about 56 species in Britain and Ireland that are under threat today. This article of ours, focussing characterisation and behaviour of a few species of butterfly, is just a small attempt to know about them better, and contribute in their conservation, before they cross the threatening range. Conserving butterflies will hopefully maintain the enriched status indiversity of Bastar and Chhattisgarh as whole, as well as add liveliness to the environment and human beings too.

Table BB-I:- Butterfly distribution from Bastar division recorded from Chhattisgarh, India, with Indian Wildlife Protection Act, 1972 Schedule status (WPA-Wildlife Protection Act; record to Central India; NRC-New record to Chhattisgarh).

A. Super Family PAPILIONOIDEA		
I. Family PAPILIONIDAE		
Subfamily Papilioninae		
1	Papilio demoleus (Linnaeus)	Lime Butterfly
2	Papilio crino (Fabricius)	Common Banded Peacock
3	Papilio polymnestor (Cramer)	Blue Mormon
4	Papilio polytes (Linnaeus)	Common Mormon
5	Papilio clytia (Linnaeus)	Common Mime
6	Graphium nomius (Esper)	Spot Swordtail
7	Graphium agamemnon (Linnaeus)	Tailed Jay
8	Graphium doson (Felder & Felder)	Common Jay
9	Pachliopta aristolochiae (Fabricius)	Common Rose
10	Pachliopta hector (Linnaeus)	Crimson Rose
II. Family PIERIDAE		

Subfamily Coliadinae		
11	Catopsilia pomona (Fabricius)	Common Emigrant
12	Catopsilia pyranthe (Linnaeus)	Mottled Emigrant
13	Eurema laeta (Boisduval)	Spotless Grass Yellow
14	Eurema brigitta (Cramer)	Small Grass Yellow
15	Eurema hecabe (Linnaeus)	Common Grass Yellow
Subfamily Pierinae		
16	Pieris canidia (Linnaeus)	Indian Cabbage White
17	Belenois aurota (Fabricius)	Pioneer
18	Cepora nerissa (Fabricius)	Common Gull
19	Delias eucharis (Drury)	Common Jezebel
20	Delias hyparete (Linnaeus)	Painted Jezebel
21	Appias lyncida (Cramer)	Chocolate Albatross
22	Leptosia nina (Fabricius)	Psyche
23	Colotis eucharis (Fabricius)	Plain Orange Tip
24	Colotis fausta (Olivier)	Large Salmon Arab
25	Pareronia hippia (Fabricius)	Common Wanderer
III. Family NYMPHALIDAE		
Subfamily Euploeinae		
26	Euploea core (Cramer)	Common Indian Crow
27	Euploea mulciber (Cramer)	Striped Blue Crow
Subfamily Danainae		
28	Danaus genutia (Cramer)	Common Tiger
29	Danaus chrysippus (Linnaeus)	Plain Tiger
30	Tirumala limniace (Cramer)	Blue Tiger
31	Tirumala septentrionis (Butler)	Dark Blue Tiger
32	Parantica aglea (Stoll)	Glassy Tiger
Subfamily Satyrinae		
33	Mycalesis visala (Moore)	Longbrand Bush Brown
34	Mycalesis perseus (Fabricius)	Common Bush Brown
35	Mycalesis visala (Moore)	Long brandBush Brown
36	Melanitis leda (Linnaeus)	Common Evening Brown
37	Melanitis zitenius (Herbst)	Great Evening Brown
38	Elymnias hypermnestra (Linnaeus)	Common Palmfly
39	Lethe rohria (Fabricius)	Common Tree Brown
40	Lethe europa (Fabricius)	Bamboo Tree Brown
41	Lethe drypetis (Hewitson)	Tamil Tree Brown
42	Orsotriaena medus (Fabricius)	Nigger
43	Ypthima huebneri (Kirby)	Common Fourring,
44	Ypthima ceylonica (Hewitson)	White or Ceylon Fourring
Subfamily Biblidinae		
45	Ariadne merione (Cramer)	Common Castor
46	Ariadne ariadne (Linnaeus)	Angled Castor
Subfamily Heliconinae		
47	Argyreus hyperbius (Linnaeus)	Indian Fritillary
48	Phalanta phalantha (Drury)	Common Leopard
49	Phalanta alcippe (Stoll)	Small Leopard
50	Acraea violae (Fabricius)	Tawny Coster
Subfamily Nymphalinae		
51	Vanessa cardui (Linnaeus)	Painted Lady
52	Junonia iphita (Cramer)	Chocolate Pansy
53	Junonia atlites (Linnaeus)	Grey Pansy
54	Junonia almana (Linnaeus)	Peacock Pansy
55	Junonia hierta (Fabricius)	Yellow Pansy
56	Junonia orithya (Linnaeus)	Blue Pansy
57	Junonia lemonias (Linnaeus)	Lemon Pansy
58	Kallima inachus (Boisduval)	Orange Oakleaf
59	Hypolimnas bolina (Linnaeus)	Great Eggfly
60	Hypolimnas misippus (Linnaeus)	Danaid Eggfly
Subfamily Limenitidinae		

61	Neptis hylas (Linnaeus)	Common Sailer
62	Neptis jumbah (Moore)	Chestnutstreaked Sailer
63	Pantoporia hordonia (Stoll)	Common Lascar
64	Athyma nefte (Cramer)	Colour Sergeant
65	Athyma ranga (Moore)	Blackvein Sergeant
66	Athyma selenophora (Kollar)	Staff Sergeant
67	Athyma perius (Linnaeus)	Common Sergeant
68	Moduza procris (Cramer)	Commander
69	Tanaecia lepidea (Butler)	Grey Count
70	Euthalia nais (Forster)	Baronet
71	Euthalia aconthea (Cramer)	Common Baron
72	Euthalia lubentina (Cramer)	Gaudy Baron
Subfamily Charaxinae		
73	Polyura athamas (Drury)	Common Nawab
74	Charaxes bernardus (Fabricius)	Tawny Rajah
75	Charaxes solon (Fabricius)	Black Rajah
IV. Family LYCAENIDAE		
Subfamily Riodininae		
76	Abisara echerius (Stoll)	Plum Judy
Subfamily Curetinae		
77	Curetis bulis (Westwood)	Bright Sunbeam
Subfamily Polyommatae		
78	Jamides celeno (Cramer)	Common Cerulean
79	Jamides alecto (Felder)	Mettalic Cerulean
80	Catochrysops strabo (Fabricius)	Forget-Me-Not
81	Lampides boeticus (Linnaeus)	Pea Blue
82	Tarucus plinius (Fabricius)	Zebra Blue
83	Tarucus callinara (Butler)	Spotted Pierrot
84	Tarucus theophrastus	Pointed Pierrot
85	Tarucus nara (Kollar)	Striped Pierrot
86	Caleta caleta (Hewitson)	Angled Pierrot
87	Castalius rosimon (Fabricius)	Common Pierrot
88	Zizeeria knysna (Trimen)	Dark Grass
89	Zizeeria otis (Fabricius)	Lesser Grass Blue
90	Zizula hylax (Fabricius)	Tiny Grass Blue
91	Pithecops corvus (Fruhstorfer)	Forest Quaker
92	Euchrysops cnejus (Fabricius)	Gram Blue
93	Acytolepis puspa (Horsfi eld)	Common Hedge Blue
94	Prosotas dubiosa (Semper)	Tailless Lineblue
95	Chilades pandava (Horsfi eld)	Plains Cupid
Subfamily Theclinae		
96	Spindasis vulcanus (Fabricius)	Common Silverline
97	Deudorix isocrates (Fabricius)	Common Guava Blue
98	Amblypodia anita Hewitson	Leaf Blue
99	Arhopala amantes (Hewitson)	Large Oakblue
100	Arhopala centaurus (Fabricius)	Western Centaur Oakblue
101	Iraota timoleon (Stoll)	Blue Silver Streak
102	Loxura atymnus (Stoll)	Yamfly
103	Tajuria cippus (Fabricius)	Peacock Royal
104	Tajuria jehana (Moore)	Plains Blue Royal
105	Chliaria othona (Hewitson)	Orchid Tit
106	Rapala iarbus (Fabricius)	Indian Red Flash
107	Rapala manea (Hewitson)	Slate Flash
V. Family HESPERIIDAE		
Subfamily Coeliadinae		
108	Hasora chromus (Cramer)	Common Banded Awl
Subfamily Pyrginae		
109	Celaenorrhinus leucocera (Kollar)	Common Spotted Flat
110	Tagiades japetus (Stoll)	Common Snow Flat
111	Spialia galba (Fabricius)	Indian Skipper
Subfamily Hesperinae		

112	Udaspes folus (Cramer)	Grass Demon
113	Notocrypta curvifascia (Felder & Felder)	Restricted Demon
114	Telicota ancilla (HerrichSchäffer)	Dark Palm Dart
115	Pelopidas mathias (Fabricius)	Small Branded
116	Caltoris kumara (Moore)	Blank Swift
117	Pseudoborbo bevani (Moore)	Bevan's Swift
118	Borbo cinnara (Wallace)	Rice Swift

References-

- [1] Arun Pratap Singh (2011, 2017). Butterfly of India. *Om Books International*. ISBN 978-3-80069-60-9.
- [2] Chandra K, Sharma RM, Singh A & Singh RK (2007). A checklist of butterflies of Madhya Pradesh and Chhattisgarh states, India. *Zoos Print Journal*, 22(8):2790-2798.
- [3] Chandra K(2006). The butterflies (*Lepidoptera*: Rhopalocera) of Kangerghati National Park (Chhattisgarh). *Advancement in Indian Entomology Productivity and Health*, 11: 83-88.
- [4] Chandra K, Singh RK, Koshta, ML (2000b). On a collection of butterfly fauna from Pachmarhi Biosphere Reserve. Pp. 72-77. Proceedings of National Seminar on *Biodiversity Conservation & Management with Special Reference on Biosphere Reserve*, EPCO, Bhopal, India.
- [5] Capinera, John L (2008). *Encyclopedia of Entomology*. Springer Science & Business Media. 676. ISBN 978-1-4020-6242-1
- [6] Fox R (2015). The State of the uk's butterflies - Butterfly Conservation.
- [7] Gupta IJ, Shukla JPN (1987). Butterflies from Bastar district (Madhya Pradesh, India). *Rec. Zool. Surv India*, 106:1-74. Kehimkar, I. 2008. The book of Indian butterflies Bombay Natural History Society, Mumbai. 497.
- [8] Gullan PJ, Cranston PS (2014). *The Insects : An outline of Entomology* (5ed.) : Wiley 523-524, ISBN 978-1-118-84616-2
- [9] Kawahara AY, Breinholt JW (2014). Phylogenomics provides strong Evidence for Relationship of Butterflies and Moths. *Proceedings of the Royal Society B: Biological Sciences*.281 (1788) :20140970
- [10] Kehimkar I, (2008). The Book of Indian Butterflies. *Bombay Natural History Society*, Mumbai. 497.
- [11] Kunte K, (2005). Butterflies of Peninsular India. *Indian Academy of Sciences. Universities Press*. 254, colour plates-31.
- [12] Rafi MA, Matin MA, Khan MR. (1999a). Number of generations and their duration of the lemon butterfly, (*Papilio demoleus* L.) in the rain fed ecology of Pakistan. *Pakistan Journal of Scientific Research* 51(3-4): 131-136.
- [13] Ramana SP, Atluri JB, Reddi CS (2003). "Autecology of the Tailed Jay Butterfly, *Graphium agamemnon* (Lepidoptera : Rhopalocera : Papilionidae)". *Journal of Environmental Biology*. 24-3- 295-303
- [14] Sharma RM, Chandra K(2009). First report of the Occurrence of some rare butterflies (Lepidoptera:Rhopalocera) from Chhattisgarh, Central India. *Rec. Zool Surv. India*. 109-3- 33-36.
- [15] Singh RK(1977). On a collection of butterflies (Insecta) from Bastar district, Madhya Pradesh, India. *Newsletter Zoological Survey of India*, 3-5- 323-326.
- [16] Schlaepfer, Gloria G (2006). Butterflies. *Marshall Cavendish*.52. ISBN 978-0-7614-1745-3.
- [17] Savella, Markku (2018). '*Papilio polytes*, Linnaeus, 1958. Lepidoptera and some other Life Forms.
- [18] Varshney RK, Smetatek, Peter (2015). *A Synoptic Catalogue of the Butterfly of India*. New Delhi. Butterfly Research Centre, Bhimtal and Indigo Publishing, New Delhi.p.7