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SHORT COMMUNICATION

Butterfly (Lepidoptera: Rhopalocera) fauna of Jabalpur City, Madhya Pradesh, India

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Abstract: The present study was carried out to reveal the butterfly species diversity in the Jabalpur City, Madhya Pradesh, India. Study was carried out from January 2008 to 2018. A total of 112 species were recorded, with an addition of 41 new species for Jabalpur district and one species for the state of Madhya Pradesh. Of the total, 42 species were very common, five were frequent common, 18 were rare, and four were very rare. Nymphalidae was dominant with 39 species, followed by Lycaenidae with 38, Pieridae with 15 species, Hesperiidae with 14, Papilionidae with eight and Riodinidae with one species. About six species of the recorded ones come under the protection category of the Indian Wildlife (Protection) Act, 1972. The study illustrated the value of Jabalpur City area in hosting valuable resources for butterflies.

Keywords: Butterflies, central India, diversity, new records.

Among insects, butterflies are sensitive biota severely affected by the environmental variations and changes in the forest structure as they are closely dependent on plants (Pollard 1991). Butterflies are generally regarded as one of the best taxonomically studied groups of insects; they have been studied systematically since the early 18th century and about 18,000 species are documented worldwide (Martinez et al. 2003). This figure is not constant because of the continuous addition of new butterflies and also due to ongoing disagreements between taxonomists over the status of many species.

The Indian subcontinent with a diverse terrain, climate, and vegetation hosts about 1,504 species of butterflies (Tiple 2011) of which peninsular India hosts 351, and the Western Ghats 336. Butterflies enable sustenance of ecosystem services through their role in pollination and serving as important food chain components. Being potential pollinating agents of their nectar plants as well as indicators of the health and quality of their host plants (Tiple et al. 2006) and the ecosystem as a whole, exploration of butterfly fauna thus becomes important in identifying and preserving potential habitats under threat.

In central India the butterfly species diversity was reported earlier by Forsayeth (1884), Swinhoe (1886), Betham (1890, 1891), Witt (1909), and D'Abreu (1931) who documented a total 177 species occurring in the erstwhile Central Provinces (now Madhya Pradesh and Vidarbha). Subsequent monumental works and fauna volumes include several species from Madhya Pradesh and Chhattisgarh (Evans 1932; Talbot 1939, 1947; Wynter-Blyth 1957). In the recent past, several

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workers have studied butterflies from some districts and conservation areas of Madhya Pradesh and Chhattisgarh (Singh 1977; Gupta and Shukla 1987; Chaudhury 1995; Chandra et al. 2000 a,b, 2002; Singh & Chandra 2002; Siddiqui & Singh, 2004; Chandra 2006). Chandra et al. (2007) recorded 174 species of butterflies belonging to 100 genera under eight families from Madhya Pradesh and Chhattisgarh. Singh & Koshta (2008) reported 39 species of butterflies from Jabalpur District, Madhya Pradesh. Recently, Tiple (2012) recorded 62 species of butterflies belonging to 47 genera and five families from TFRI Campus, Jabalpur.

The present study was started with a view to examine the diversity of butterflies from Jabalpur City. Since there is no published checklist of butterfly from Jabalpur city prior to this, the present work could be the baseline for further research.

Materials and Methods

The findings presented in the article are based on opportunistic sampling and photo documentation was carried out on a biweekly basis from 2008 to 2018 in and around Jabalpur City. Identification of the butterflies was primarily made directly in the field. In critical condition specimens were collected only with handheld aerial sweep nets and subsequently released without harm. Each specimen was placed in plastic bottles and carried to the laboratory for further identification with the help of field guides (Wynter-Blyth 1957; Kunte 2000). The species were categorized on the basis of their abundance in Jabalpur City. The butterflies were categorized as VC—Very common (> 100 sightings), C—Common (51–100 sightings), FC—Frequent common (16–50 sightings), R—Rare (2–15 sightings), VR—Very rare (< 2 sightings) (Tiple 2012). The species recorded for the first time from the Jabalpur district are marked with asterisk (*), and those which were previously unrecorded in Madhya Pradesh are marked with #.

Study Sites

Jabalpur is one of the largest and the most crowded cities in Madhya Pradesh and located in the centre of India at 23.16°10’7.57’’N and 79.93°55’54.64’’E. Jabalpur City has a humid subtropical climate having three main seasons: the wet monsoon season from June to October, the cool dry winter from October to March, and the hot dry season from April till the onset of the rains in the beginning of June. The temperature of the city ranges from a minimum of 10°C to a maximum of 45°C with a relative humidity 10–15% to 60–95%. Annual precipitation is 1,386mm.

All the study sites were within and around Jabalpur City within a radius of 20km. Butterflies were surveyed in Dumna Nature Reserve, Dhobi Reserve Forest, Lower Gaur Reserve Forest, city gardens, Tropical Forest Research Institute (TFRI), Airport Road, Medical College

Image 1. Jabalpur City. Source: Google Earth

Campus, Bhedaghat, Pariyat Tank, Parashuram Kund, Madan Mahal Hills, areas adjacent to river Narmada and Bargi dam during the monsoon and post monsoon period (Image 1).

Results and Discussion

During the course of study 112 species of butterflies referable to 71 genera, belonging to six families were recorded. This study added 41 species as new records for Jabalpur District and one species for Madhya Pradesh. The highest number of butterflies belonged to the family Nymphalidae (39 species) with nine new records (viz.: *Athyma selenophora*, *Byblia ilithyia*, *Charaxes psaphon*, *Euploea klugii*, *Mycalesis visala*, *Phaedyma columella*, *Neptis jumbah*, *Ypthima sterope*, and *Ypthima indica*). This was followed by the Lycaenidae with 38 species and19 new records (viz.: *Acytolepis puspa*, *Amblypodia anita*, *Anthene lycaenina*, *Azanus ubaldus*, *Chilades lajus*, *Everes lacturnus*, *Iraota timoleon*, *Jamides celeno*, *Prosotas dubiosa*, *Rapala manea*, *Spindasis ictis*, *Spindasis schistacea*, *Tajuria cippus*, *Talicada nyseus*, *Tarucus balkanicus*, *Tarucus callinara*, *Zizeeria karsandra*, *Azanus gesous*, and *Caleta decidia*). In Pieridae, 15 species with four new records were recorded (*Colotis fausta*, *Colotis danae*, *Colotis etrida*, and *Ixias marianne*). A total of 15 hesperiid species were recorded with five new records (*Baoris farri*, *Parnara naso*, *Sarangesa dasahara*, *Suastus gremius*, and *Udaspes folus*). Nine species were recorded from the family Papilionidae with two new records (*Graphium doson* and *Papilio clytia*) and *Abisara bifasciata* new species recorded from the family Riodinidae (Figure 1). *Euploea klugii* was recorded for the first time from Madhya Pradesh (Image 2). Formerly, *E. klugii*, a very widely distributed species was recorded only from northeastern India, Western Ghats, and Odisha.

Among the 112 species of butterflies about 38% (43) were common, 38% (42) species were very common, 4% (five) were frequent common, 16% (18) were rare, and 4% (four) were very rare (*Papilio clytia*, *Byblia ilithyia*, *Neptis jumbah*, and *Iraota timoleon*). The observed and identified species, their status in and around the city of Jabalpur are listed in Table 1.

Among the 112 butterflies recorded, six species (*Pachliopta hector, Euploea core, Hypolimnas misippus, Euchrysops cnejus Ionolyce helicon*, and *Baoris farri*) are protected under the Indian Wildlife (Protection) Act, 1972. Interestingly, butterflies (*Neptis soma*, *Melanitis phedima*, *Abisara echerius*) which were recorded earlier from Jabalpur city were not seen during the present study. The probable causes of this could be the loss of

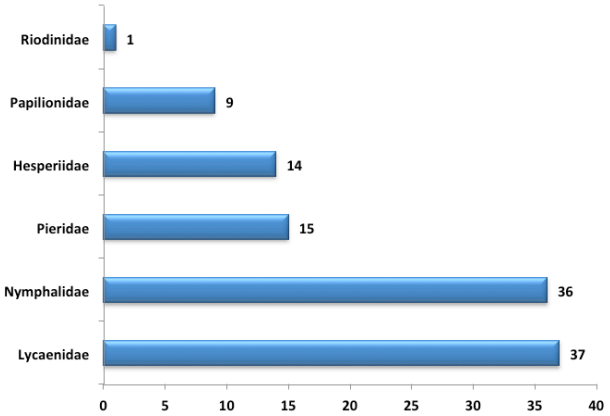

Figure 1. The number of butterfly species encountered in different families in the Jabalpur City, Madhya Pradesh.

Image 2. *Euploea klugii*, a new record for Madhya Pradesh State.

habitats due to ever-expanding urbanization along with the broader climatic changes. As reported by Kunte (2000), an objective revision of the scheduled list is necessary to provide appropriate and adequate legal protection to Indian butterflies.

Wynter-Blyth (1957) had identified two seasons as peaks, March–April and October for butterfly abundance in India. The abundance of diverse species was positively affected by approaching summer, high relative humidity and more rainfall. In the present investigation most butterfly species were observed from the monsoon (hot/wet season) to early winter (cool/wet season) months but subsequently declined in early summer (March). Among the 112 species of butterflies, *Papilio demoleus*, *Pachliopta aristolochiae*, *Catopsilia pomona*, *Eurema hecabe*, *Danaus chrysippus*, *Tirumala limniace*, *Acraea violae*, *Euploea core*, *Junonia lemonias*, *Catochrysops strabo*, and *Chilades putli* were found throughout the year (January–December), whereas the remaining 101 species of butterflies were prominently observed only

Table1. List of butterflies recorded from Jabalpur city together with common name and status. [*: new record in Jabalpur district; #: new record for Madhya Pradesh state; abundance acronyms: VC—Very common (> 100 sightings) | C—Common (51–100 sightings) | FC—Frequent common (16–50 sightings) | R—Rare (2–15 sightings) | VR—Very rare (< 2 sightings)]

	Scientific name	Common name	Status
	Family Papilionidae		
1	*Graphium agamemnon* (Linnaeus, 1758)	Tailed Jay	C
2	*Graphium doson* (C. & R. Felder, 1864)*	Common Jay	R
3	*Graphium nomius* (Esper, 1799)	Spot Swordtail	C
4	*Pachliopta aristolochiae* (Fabricius, 1775)	Common Rose	C
5	*Pachliopta hector* (Linnaeus, 1758)	Crimson Rose	C
6	*Papilio clytia* Linnaeus, 1758*	Common Mime	VR
7	*Papilio demoleus* Linnaeus, 1758	Lime Butterfly	VC
8	*Papilio polymnestor* Cramer, [1775]	Blue Mormon	FC
9	*Papilio polytes* Linnaeus, 1758	Common Mormon	VC
	Family Pieridae		
10	*Belenois aurota* (Fabricius, 1793)	Pioneer	C
11	*Catopsilia pomona* (Fabricius, 1775)	Common or Lemon Emigrant	VC
12	*Catopsilia pyranthe* (Linnaeus, 1758)	Mottled Emigrant	VC
13	*Cepora nerissa* (Fabricius, 1775)	Common Gull	VC
14	*Colotis fausta* (Olivier, 1804) *	Large Salmon Arab	R
15	*Colotis danae* (Fabricius, 1775) *	Crimson Tip	R
16	*Colotis etrida* (Boisduval, 1836) *	Small Orange Tip	R
17	*Delias eucharis* (Drury, 1773)	Common Jezebel	VC
18	*Eurema blanda* (Boisduval, 1836)	Three-Spot Grass Yellow	R
19	*Eurema brigitta* (Stoll, [1780])	Small Grass Yellow	C
20	*Eurema hecabe* (Linnaeus, 1758)	Common Grass Yellow	VC
21	*Eurema laeta* (Boisduval, 1836)	Spotless Grass Yellow	VC
22	*Ixias marianne* (Cramer, [1779]) *	White Orange Tip	C
23	*Leptosia nina* (Fabricius, 1793)	Psyche	C
24	*Pareronia hippie* (Fabricius, 1787)	Common Wanderer	C
	Family Nymphalidae		
25	*Acraea terpsicore* (Linnaeus, 1758)	Tawny Coster	VC
26	*Ariadne merione* (Cramer, [1777])	Common Castor	C
27	*Ariadne ariadne (Linnaeus)*	Angled Castor	C
28	*Athyma selenophora* (Kollar, [1844]) *	Staff Sergeant	R
29	*Byblia ilithyia* (Drury, [1773]) *	Joker	VR
30	*Charaxes psaphon* Westwood, 1847*	Tawny Rajah	R
31	*Charaxes solon* (Fabricius, 1793)	Black Rajah	C
32	*Vanessa cardui* (Linnaeus, 1758)	Painted Lady	C
33	*Danaus chrysippus* (Linnaeus, 1758)	Plain Tiger	VC
34	*Danaus genutia* (Cramer, [1779])	Striped Tiger	VC
35	*Euploea core* (Cramer, [1780])	Common Indian Crow	VC
36	*Euploea klugii* Felder & Felder, 1865 *#	Brown King Crow	R
37	*Euthalia aconthea* (Cramer, [1777])	Common Baron	R
38	*Hypolimnas bolina* (Linnaeus, 1758)	Great Eggfly	C
39	*Hypolimnas misippus* (Linnaeus, 1764)	Danaid Eggfly	C
40	*Junonia almana* (Linnaeus, 1758)	Peacock Pansy	VC

	Scientific name	Common name	Status
41	*Junonia atlites* (Linnaeus, 1763)	Grey Pansy	C
42	*Junonia hierta* (Fabricius, 1798)	Yellow Pansy	C
43	*Junonia iphita* (Cramer, [1779])	Chocolate Pansy	VC
44	*Junonia lemonias* (Linnaeus, 1758)	Lemon Pansy	VC
45	*Junonia orithya* (Linnaeus, 1758)	Blue Pansy	VC
46	*Melanitis leda* (Linnaeus, 1758)	Common Evening Brown	VC
47	*Moduza procris* (Cramer, [1777])	Commander	C
48	*Mycalesis mineus* (Linnaeus, 1758)	Dark Branded Bushbrown	C
49	*Mycalesis perseus* (Fabricius, 1775)	Common Bushbrown	VC
50	*Mycalesis visala* Moore, [1858] *	Long-brand Bushbrown	R
51	*Phaedyma columella* (Cramer, [1780]) *	Short-banded Sailer	C
52	*Neptis hylas* (Linnaeus, 1758)	Common Sailer	VC
53	*Neptis jumbah* Moore, [1858] *	Chestnut-Streaked Sailer	VR
54	*Phalanta phalantha* (Drury, [1773])	Common Leopard	VC
55	*Charaxes agrarius* (Swinhoe, 1887)	Anomalous Nawab	C
56	*Symphaedra nais* (Forster, 1771)	Baronet	C
57	*Tirumala limniace* (Cramer, [1775])	Blue Tiger	VC
58	*Ypthima asterope* (Klug, 1832) *	Common Threering	VC
59	*Ypthima baldus* (Fabricius, 1775)	Common Fivering	R
60	*Ypthima inica* (Hewitson, 1865) *	Lesser Threering	C
	Family Riodinidae		
61	*Abisara bifasciata* Moore, 1877*	Double-banded Judy	R
	Family Lycaenidae		
62	*Acytolepis puspa* (Horsfield, [1828]) *	Common Hedge Blue	VC
63	*Amblypodia anita* Hewitson, 1862*	Leaf Blue	C
64	*Anthene lycaenina* (Felder, 1868) *	Pointed Ciliate Blue	C
65	*Arhopala amantes* (Hewitson, 1862)	Large Oakblue	C
66	*Azanus jesous* (Lederer 1855) *	African Babul blue	C
67	*Azanus ubaldus* (Stoll, [1782]) *	Bright Babul Blue	R
68	*Castalius rosimon* (Fabricius, 1775)	Common Pierrot	VC
69	*Catochrysops strabo* (Fabricius, 1793)	Forget-Me-Not	VC
70	*Chilades lajus* (Stoll, [1780]) *	Lime Blue	C
71	*Luthrodes pandava* (Horsfield, [1829])	Plains Cupid	VC
72	*Chilades parrhasius* (Fabricius, 1793)	Small Cupid	R
73	*Freyeria putli* (Kollar, [1844])	Eastern grass Jewel	VC
74	*Virachola isocrates* (Fabricius, 1793)	Common Guava Blue	C
75	*Euchrysops cnejus* (Fabricius, 1798)	Gram Blue	VC
76	*Everes lacturnus* (Godart, [1824]) *	Indian Cupid	C
77	*Iraota timoleon* (Stoll, [1790]) *	Silverstreak Blue	VR
78	*Jamides bochus* (Stoll, [1782])	Dark Cerulean	C
79	*Jamides celeno* (Cramer, [1775]) *	Common Cerulean	VC
80	*Lampides boeticus* (Linnaeus, 1767)	Pea Blue	VC
81	*Leptotes plinius* (Fabricius, 1793)	Zebra Blue	VC
82	*Prosotas dubiosa* (Semper, [1879]) *	Tailless Lineblue	C
83	*Prosotas nora* (Felder, 1860)	Common Lineblue	C

	Scientific name	Common name	Status
84	*Psuedozizeeria maha* (Kollar, [1844])	Pale Grass Blue	C
85	*Rapala iarbus* (Fabricius, 1787)	Common Red Flash	C
86	*Rapala manea* (Hewitson, 1863) *	Slate Flash	C
87	*Spindasis ictis* (Hewitson, 1865) *	Common Shot Silverline	C
88	*Spindasis schistacea* (Moore, [1881]) *	Plumbeous Silverline	R
89	*Spindasis vulcanus* (Fabricius, 1775)	Common Silverline	VC
90	*Tajuria cippus* (Fabricius, 1798) *	Peacock Royal	R
91	*Talicada nyseus* (Guérin- Menéville, 1843) *	Red Pierrot	FC
92	*Tarucus balkanicus nigra* Bethune-Baker, [1918] *	Black-spotted Pierrot	C
93	*Tarucus callinara* Butler, 1886*	Spotted Pierrot	C
94	*Tarucus nara* (Kollar, 1848)	Rounded Pierrot/ Striped Pierrot	VC
95	*Zizeeria karsandra* (Moore, 1865) *	Dark Grass Blue	VC
96	*Zizina otis* (Fabricius, 1787)	Lesser Grass Blue	VC
97	*Zizula hylax* (Fabricius, 1775)	Tiny Grass Blue	VC
98	*Caleta decidia* (Hewitson 1876) *	Angled Peirrot	FC
	Family Hesperiidae		
99	*Badamia exclamationis* (Fabricius, 1775)	Brown Awl	VC
100	*Baoris farri* (Moore, 1878) *	Paintbrush Swift	R
101	*Borbo cinnara* (Wallace, 1866)	Rice Swift	VC
102	*Caltoris kumara* (Moore, 1878)	Blank Swift	VC
103	*Coladenia indrani* (Moore, [1866])	Tricolour Pied Flat	FC
104	*Hasora chromus* (Cramer, [1780])	Common Banded Awl	VC
105	*Parnara naso* (Fabricius, 1798) *	Straight Swift	C
106	*Pelopidas mathias* (Fabricius, 1798)	Small Branded Swift	VC
107	*Sarangesa dasahara* Moore, [1866] *	Common Small Flat	R
108	*Spialia galba* (Fabricius, 1793)	Indian Skipper	C
109	*Suastus gremius* (Fabricius, 1798) *	Indian Palm Bob	C
110	*Telicota bambusae* (Moore, 1878)	Dark Palm Dart	VC
111	*Telicota colon* (Fabricius, 1775)	Pale Palm Dart	FC
112	*Udaspes folus* (Cramer, [1775]) *	Grass Demon	C

after June–July till the beginning of summer (April–May). Increasing species abundance from beginning of monsoon (June–July) till the early winter (August–November) and decline in species abundance from late winter (January–February) up to the end of summer have also been reported by Tiple et al. (2007) and Tiple (2012) in similar climatic conditions in this region of central India. They further demonstrated that most species were noticeably absent in the disturbed and human-impacted sites (gardens, plantations, and grasslands) and there was no occurrence of unique species in moderately disturbed areas comparable to those of less-disturbed wild areas. Jabalpur City is always disturbed and stressed by human actions, which may be the reasons for overall reduction of unique species from human-disturbed sites as compared to the other sites. The cause of this decline might be non-availability of nectar and larval host plants, scarcity of water, and cutting of grasslands (Tiple et al. 2007).

We are rapidly losing greenery in the name of development. There has also been an alarming rise in industrial and automobile pollution in Indian cities. With the shrinking of greenery and increase in pollution, butterflies, birds and all our wildlife are fast disappearing. The net result is a complete imbalance of the ecosystem and extinction of many species. In spite of the fast growth, Indian cities still have diverse serene habitats such as the traffic island gardens in the middle of busy roads, parks or urban forest areas with mixed deciduous and non-deciduous trees and scrubland

serving as ideal habitats for various types of insects, especially butterflies.

The findings of the present study underline the importance of the city as a preferred habitat for butterflies. If the landscaping and maintenance of gardens are carefully planned, the diversity of butterflies may increase in Jabalpur City providing a rich ground for butterfly conservation as well as for research. This study will also add to our future attempts in understanding the complex nature of mutualistic interaction between butterflies and flowering plants that is essential for continuity of ecosystem services. The present list of butterfly species is not conclusive and exhaustive and future exploration will be continued to update this checklist.

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