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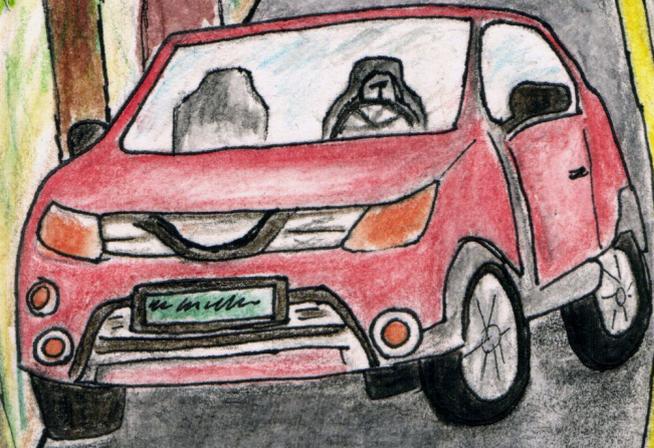
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Caption: Lowland Tapir *Tapirus terrestris* (Medium—watercolours on watercolour paper) © Aakanksha Komanduri.



Butterflies of Amrabad Tiger Reserve, Telangana, India

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Abstract: The butterfly diversity of Amrabad Tiger Reserve was assessed from March 2018 to February 2021. A total of 106 species belonging to the families Nymphalidae (36 species), Lycaenidae (30 species), Pieridae (18 species), Hesperidae (14 species), and Papilionidae (8 species) were recorded. Of these, 12 species belonged to the Schedules I, II & IV of the Indian Wildlife Protection Act, and four were common in this region.

Keywords: Butterfly diversity, Hesperidae, Lycaenidae, Nymphalidae, Papilionidae, Pieridae, status.

Telangana state having a wide range of ecosystems is rich in its biodiversity (Khartade et al. 2019). Approximately, 26,900 km² area constituting 24% of the total area are under forest. There are 12 protected areas, which consists of seven wildlife sanctuaries, three national parks and two tiger reserves. Amrabad Tiger Reserve is located in the northern part of Nallamala Hills, Eastern Ghats and on the banks of river Krishna. It has an area of 2,611.39km² with deciduous forest harbouring a wide variety of flora and fauna. It was previously a part of Nagarjunasagar Srisailem Tiger Reserve (NSTR), Andhra Pradesh. After bifurcation of Andhra Pradesh, the area of NSTR falling under the newly formed Telangana state was designated as Amrabad Tiger Reserve.

A total of 2,450 faunal species have been reported so far from the state of Telangana (Chandra et al. 2021), including 165 species of butterflies (Sailu et al. 2021). Earlier studies from adjacent habitats of the Eastern Ghats by Rao et al. (2004) reported 89 butterfly species from NSTR, Andhra Pradesh; Raju et al. (2003) reported 68 species from Visakhapatnam; Venkataramana (2010) reported 70 species from Visakhapatnam, Ananthagiri and Ratnagiri hills of Eastern Ghats; Ramamurty et al. (2013) reported 78 species from Visakhapatnam, Andhra Pradesh; and Goswami et al. (2018) recorded 102 species of butterflies from northern Eastern Ghats of Andhra Pradesh. In this study, an attempt has been made to document the butterfly diversity of Amrabad Tiger Reserve, Telangana.

MATERIALS AND METHODS

Sampling of butterflies was made in 20 different sampling stations on a seasonal basis to cover different stretches of the tiger reserve. Observations were made by transect method from 0700–0900 h at least to cover 5 km of every sampling station, and randomised sampling from 9-11am and 4-6pm during the years 2018-2021 (Table 1, Figure 1). Butterflies were observed using

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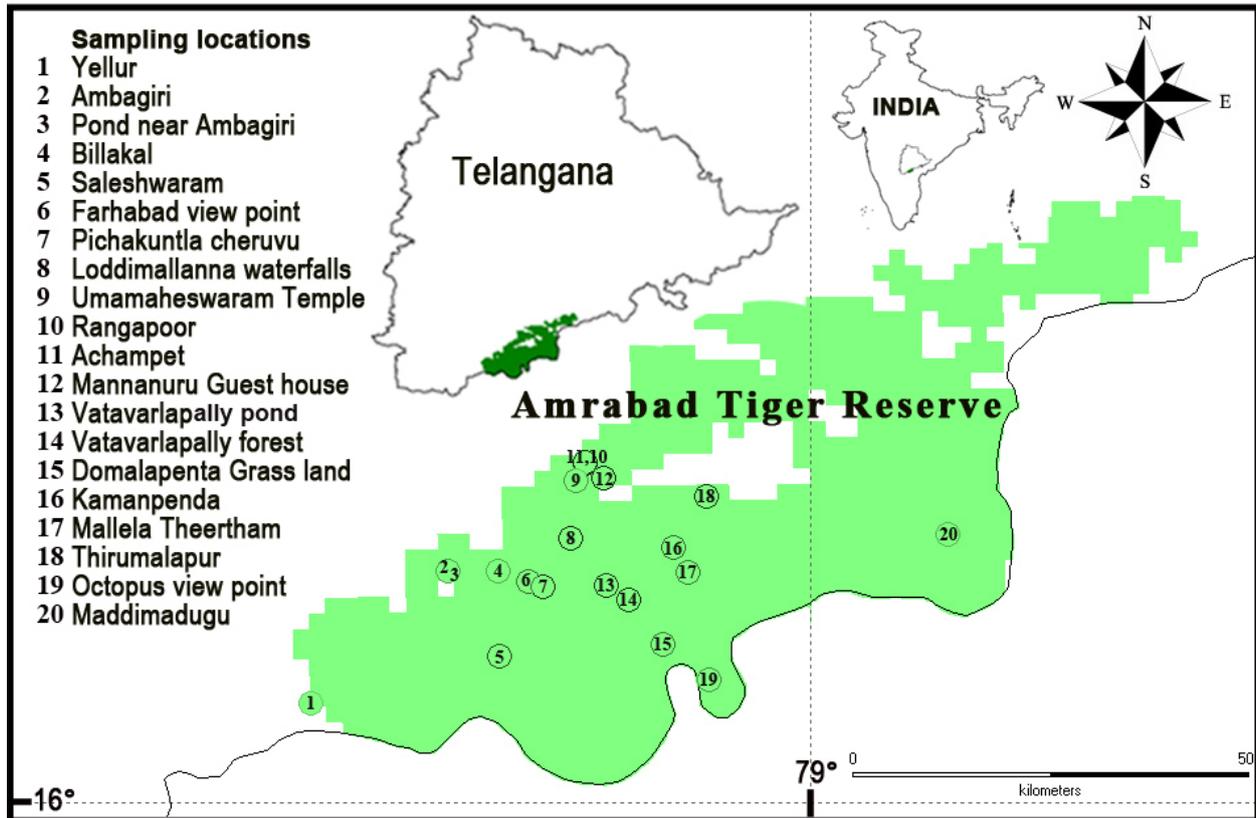


Figure 1. Map showing the sampling location of the Amrabad Tiger Reserve, Telangana.

Nikon binoculars and photographed by Nikon D500 DSLR camera. Collections were made with the help of a sweep net, samples were dry preserved and deposited in the museum collections of Zoological Survey of India, Freshwater Biology Regional Centre, Hyderabad. Species classification and nomenclature were after Kunte (2000), Kehimkar (2008), and Bhakare & Ogale (2018).

RESULTS AND DISCUSSION

A total of 106 species of butterflies belonging to 68 genera, five families (Table 2, Image 1–106) were recorded from the Amrabad Tiger Reserve. Of these, specimens of 85 species have been collected and preserved. The remaining species were only photographed. Among the various families recorded, Nymphalidae with 36 species and 22 genera, showed high diversity followed by Lycaenidae (30 species) (Figure 2). Among these, 12 species belonged to the schedules I, II & IV of the Indian Wildlife Protection Act (1972). Four species namely, viz., Dark Glass Blue *Zizeeria karsandra*, Peacock Pansy *Junonia almana*, Yellow Pansy *Junonia hierta*, and Small Grass Yellow *Eurema brigitta* were common, and assessed as ‘Least Concern’ as per IUCN Red List.

The maximum number of species was observed from

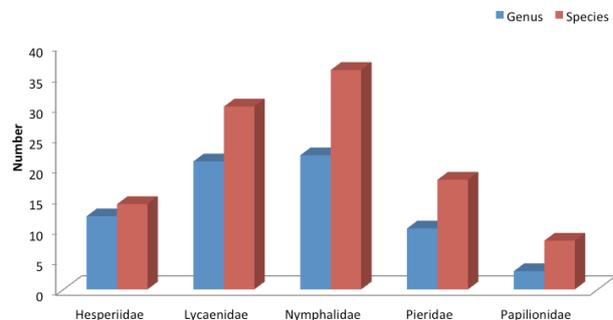


Figure 2. Family-wise species composition of butterflies of Amrabad Tiger Reserve.

Umamaheswaram temple with 35 species, followed by Saleshwaram with 25 species, Pichakuntla cheruvu and Billakal with 21 species each. Most of the species are common, and seven were observed rarely, such as *Caprona ransonnettii* from Mallelatheertham waterfalls, *Neptis jumbah* from Domalapenta grassland, *Lethe europa*, *Phaedym columella*, *Spindasis schistacea* from Saleshwaram, *Polyura agrarian* from Umamaheswaram, *Colotis fausta* from Pichakuntla cheruvu, *Appias libythea* from Ambagiri and Kamanpenda.

Table 1. Sampling locations of Amrabad Tiger Reserve, Telangana.

	Locality	Longitude (E)	Latitude (N)
1	Achampet	78.7377	16.3930
2	Ambagiri	78.5792	16.2678
3	Thirumalapur	78.8775	16.3554
4	Billakal	78.6369	16.2678
5	Domalapenta Grass land	78.8264	16.1831
6	Farhabad view point	78.6714	16.2561
7	Kamanpenda	78.8391	16.2958
8	Loddimalanna waterfalls	78.7203	16.3061
9	Maddimadugu	79.1551	16.3115
10	Mallela Theertham Waterfalls	78.8558	16.2672
11	Mannanuru Guest house	78.7583	16.3758
12	Octopus view point	78.8800	16.1415
13	Pichakuntla cheruvu	78.6889	16.2506
14	Pond near Ambagiri	78.5792	16.2675
15	Rangapoor	78.7375	16.3939
16	Saleshwaram	78.6392	16.1689
17	Umamaheswaram Temple	78.7267	16.3728
18	Vatavarlapally forest	78.7881	16.2350
19	Vatavarlapally pond	78.7614	16.2514
20	Yellur	78.4217	16.1153

The 165 species of butterflies have been recorded from Telangana, and the species recorded in this study represent 64% of those reported from the state. Eighty-nine species were reported from NSTR and of these 20 were not observed in the present study. The present study documented 34 new additions to the list of butterfly species of Amrabad Tiger Reserve. Butterflies recorded in this study showed 69% similarity with species recorded in Rao et al. (2004), 50% with Goswami et al. (2018), 68% with Raju et al. (2003), and 62% with Venkataramana (2010). It shows that the northern and southern Eastern Ghats species distribution are approximately 45% dissimilar, it could be due to variation in habitat, host plant and climatic conditions.

The family Nymphalidae are dominant in the tropical region because most of them are polyphagous in nature and thus able to survive in all habitats. Additionally, many species of this family are strong, active fliers able to search for resources in large areas (Easwaran & Pramod 2005; Krishnakumar et al. 2008). The high proportion of nymphalidae observed might also be due to the availability of a variety of host plants in Amrabad Tiger Reserve. The predominance of Nymphalidae over other butterfly groups in the Western Ghats has earlier been

Table 2 List of Butterfly species recorded from Amrabad Tiger Reserve, Telangana

	Scientific name	Common name	IUCN Status	WPA Status
Hesperiidae				
1	<i>Borbo cinnara</i> (Wallace, 1866)	Rice Swift		
2	<i>Caltoris kumara</i> (Moore, 1878)	Blank Swift		
3	<i>Caprona agama</i> (Moore, 1858)	Spotted Angle		
4	<i>Caprona ransonnettii</i> (R.Felder, 1868)	Golden Angle		
5	<i>Hasora chromus</i> (Cramer, 1780)	Common Banded Awl		
6	<i>Matapa aria</i> (Moore, 1866)	Common Red Eye		
7	<i>Lambrix salsala</i> (Moore, 1866)	Chestnut Bob		
8	<i>Parnara ganga</i> Evans, 1937	Continental Swift		
9	<i>Pelopidas mathias</i> (Fabricius, 1798)	Small-Branded Swift		
10	<i>Pelopidas subochracea</i> (Moore, 1878)	Large Banded Swift		
11	<i>Spialia galba</i> (Fabricius, 1793)	Indian Skipper		
12	<i>Suastus gremius</i> (Fabricius, 1798)	Indian Palm Bob		
13	<i>Telicota bambusae</i> (Moore, 1878)	Dark Palm Dart		
14	<i>Udaspes folus</i> (Cramer, 1775)	Grass Demon		
Lycaenidae				
15	<i>Azanus jesous</i> (Guérin-Méneville, 1849)	African Babul Blue		
16	<i>Azanus ubaldus</i> (Stoll, 1782)	Bright Babul Blue		
17	<i>Azanus uranus</i> Butler, 1886	Dull Babul Blue		
18	<i>Caleta decidia</i> (Hewitson, 1876)	Angled Pierrot		
19	<i>Castalius rosimon</i> (Fabricius, 1775)	Common Pierrot		Schedule I Species
20	<i>Catochrysops panormus</i> (C.Felder, 1860)	Silver Forget-Me-Not		
21	<i>Catochrysops strabo</i> (Fabricius, 1793)	Forget-Me-Not		
22	<i>Chilades lajus</i> (Stoll, 1780)	Indian Lime blue		
23	<i>Chilades pandava</i> (Horsfield, 1829)	Plains Cupid		
24	<i>Chilades parrhasius</i> (Fabricius, 1793)	Small Cupid		
25	<i>Curetis thetis</i> (Drury, 1773)	Indian Sunbeam		
26	<i>Euchrysops cnejus</i> (Fabricius, 1798)	Gram Blue		Schedule II Species
27	<i>Everes lacturuns</i> (Godart, 1824)	Indian Cupid		
28	<i>Freyeria putli</i> (Kollar, 1844)	Small Grass Jewel		



	Scientific name	Common name	IUCN Status	WPA Status
29	<i>Jamides bochus</i> (Stoll, 1782)	Dark Cerulean		
30	<i>Jamides celeno</i> (Cramer 1775)	Common Cerulean		
31	<i>Lampides boeticus</i> (Linnaeus, 1767)	Pea Blue		Schedule II Species
32	<i>Leptotes plinius</i> (Fabricius, 1793)	Zebra Blue		
33	<i>Prosotas dubiosa indica</i> (Evans, 1925)	Tailless Line Blue		
34	<i>Prosotas nora</i> (C.Felder, 1860)	Common Line Blue		
35	<i>Rathinda amor</i> (Fabricius, 1775)	Monkey Puzzle		
36	<i>Spindasis ictis</i> (Hewitson, 1865)	Common Shot Silverline		
37	<i>Spindasis schistacea</i> (Moore, 1881)	Plumbeous Silverline		
38	<i>Spindasis vulcanus</i> (Fabricius, 1775)	Common Silverline		
39	<i>Talicauda nyseus</i> (Guérin-Méneville, 1843)	Red Pierrot		
40	<i>Tarucus nara</i> (Kollar, 1848)	Striped Pierrot		
41	<i>Virachola isocrates</i> (Fabricius, 1793)	Common Guava blue		
42	<i>Zizeeria karsandra</i> (Moore, 1865)	Dark Grass Blue	Least Concern	
43	<i>Zizina otis</i> (Fabricius, 1787)	Lesser Grass Blue		
44	<i>Zizula hylax</i> (Fabricius, 1775)	Tiny Grass Blue		
	Nymphalidae			
45	<i>Acraca terpsicore</i> (Linnaeus, 1758)	Tawny Coster		
46	<i>Ariadne merione</i> (Cramer, 1777)	Common Castor		
47	<i>Ariadne ariadne</i> (Linnaeus, 1763)	Angled Castor		
48	<i>Byblia ithyia</i> (Drury, 1773)	Joker		
49	<i>Charaxes solon</i> (Fabricius, 1793)	Black Rajah		Schedule II Species
50	<i>Danaus chrysippus</i> (Linnaeus, 1758)	Plain Tiger		
51	<i>Danaus genutia</i> (Cramer, 1779)	Striped Tiger		
52	<i>Euploea core</i> (Cramer, 1780)	Common Crow		
53	<i>Euploea sylvestris</i> (Fabricius, 1793)	Double-Branded Crow		
54	<i>Euthalia aconthea</i> (Cramer, 1777)	Common Baron		Schedule II Species
55	<i>Hypolimnas bolina</i> (Linnaeus, 1758)	Great Eggfly		
56	<i>Hypolimnas misippus</i> (Linnaeus, 1764)	Danaid Eggfly		Schedule I Species
57	<i>Junonia almana</i> (Linnaeus, 1758)	Peacock Pansy	Least Concern	
58	<i>Junonia atlites</i> (Linnaeus, 1763)	Gray Pansy		
59	<i>Junonia hierta</i> (Fabricius, 1798)	Yellow Pansy	Least Concern	
60	<i>Junonia iphita</i> (Cramer, 1779)	Chocolate pansy		

	Scientific name	Common name	IUCN Status	WPA Status
61	<i>Junonia lemonias</i> (Linnaeus, 1758)	Lemon Pansy		
62	<i>Junonia orithya</i> (Linnaeus, 1758)	Blue Pansy		
63	<i>Lethe europa</i> (Fabricius, 1775)	Bamboo Tree Brown		
65	<i>Melanitis leda</i> (Linnaeus, 1758)	Common Evening Brown		
66	<i>Modura procris</i> (Cramer, 1777)	Commander		
67	<i>Mycalesis mineus</i> (Linnaeus, 1758)	Dark Banded Bush Brown		Schedule II Species
67	<i>Mycalesis perseus</i> (Fabricius, 1775)	Common Bushbrown		
68	<i>Neptis hylas</i> (Linnaeus, 1758)	Common Sailer		
69	<i>Neptis jumbah</i> Moore, 1858	Chestnut Streaked Sailer		Schedule I Species
70	<i>Phaedyma columella</i> (Cramer, 1780)	Short Banded Sailer		
71	<i>Parantica aglea</i> (Stoll, 1782)	Glassy Tiger		
72	<i>Phalantha phalantha</i> (Drury, 1773)	Common Leopard		
73	<i>Polyura agraria</i> (Swinhoe, 1887)	Anomalous Nawab		
74	<i>Polyura athamas</i> (Drury, 1773)	Common Nawab		Schedule II Species
75	<i>Symphhaedra nais</i> (Forster, 1771)	Baronet		
76	<i>Tirumala limniace</i> (Cramer, 1775)	Blue Tiger		
77	<i>Tirumala septentrionis</i> (Butler, 1874)	Dark Blue tiger		
78	<i>Vanessa cardui</i> (Linnaeus, 1758)	Painted Lady		
79	<i>Ypthima asterope</i> (Klug, 1832)	Common Three-Ring		
80	<i>Ypthima balus</i> (Fabricius, 1775)	Common Five Ring		
	Pieridae			
81	<i>Appias albina</i> (Boisduval, 1836)	Common Albatross		
82	<i>Appias libythea</i> (Fabricius, 1775)	Striped Albatross		Schedule IV Species
83	<i>Belenois aurota</i> (Fabricius, 1793)	Pioneer		
84	<i>Catopsilia pyranthe</i> (Linnaeus, 1758)	Mottled Emigrant		
85	<i>Catopsilia pomona</i> (Fabricius, 1775)	Common Emigrant		
86	<i>Cepora nerissa</i> (Fabricius, 1775)	Common Gull		Schedule II Species
87	<i>Colotis aurora</i> (Cramer, 1780)	Plain Orange Tip		
88	<i>Colotis danae</i> (Fabricius, 1775)	Crimson Tip		
89	<i>Colotis etrida</i> (Boisduval, 1836)	Little Orange Tip		
90	<i>Colotis fausta</i> (Olivier, 1804)	Large Salmon Arab		
91	<i>Delias eucharis</i> (Drury, 1773)	Common Jezebel		
92	<i>Eurema brigitta</i> (Stoll, 1780)	Small Grass Yellow	Least Concern	

	Scientific name	Common name	IUCN Status	WPA Status
93	<i>Eurema hecabe</i> (Linnaeus, 1758)	Common Grass Yellow		
94	<i>Eurema laeta</i> (Boisduval, 1836)	Spotless Grass Yellow		
95	<i>Leptosia nina</i> (Fabricius, 1793)	Psyche		
96	<i>Ixias marianne</i> (Cramer, 1779)	White Orange Tip		
97	<i>Ixias pyrene</i> (Linnaeus, 1764)	Yellow Orange Tip		
98	<i>Pareronia hippia</i> (Fabricius, 1787)	Common Wanderer		
	Papilionidae			
99	<i>Graphium agamemnon</i> (Linnaeus, 1758)	Tailed Jay		
100	<i>Graphium doson</i> (C&R Felder, 1864)	Common Jay		
101	<i>Graphium nomius</i> (Esper, 1799)	Spot Swordtail		
102	<i>Pachliopta aristolochiae</i> (Fabricius, 1775)	Common Rose		
103	<i>Pachliopta hector</i> (Linnaeus, 1758)	Crimson Rose		Schedule I Species
104	<i>Papilio demoleus</i> Linnaeus, 1758	Lime Butterfly		
105	<i>Papilio polytes</i> Linnaeus, 1758	Common Mormon		
106	<i>Papilio crino</i> Fabricius, 1793	Common Banded Peacock		

WPA—Wildlife Protection Act | IUCN—International Union for Conservation of Nature.

reported by (Kunte 1997; Easwaran & Pramod 2005). Amrabad Tiger Reserve has mixed vegetation supporting rich species diversity. The increase in butterfly diversity may be due to favourable climatic conditions, availability of more number of host plants and vegetation cover of herbs, shrubs and trees for nectaring of butterflies (Tiple 2009). Since, the Amrabad Tiger Reserve hosts the scheduled and least concern species, conservation measures to ensure habitat protection in the tiger reserve are essential. However, further studies on ecology, threats and conservation of butterfly needs to be focused.

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Image 1–35. 1—*Borbo cinnara* | 2—*Caltoris kumara* | 3—*Caprona agama* | 4—*Caprona ransonnettii* | 5—*Hasora chromus* | 6—*Matapa aria* | 7—*Lambrix salsala* | 8—*Parnara ganga* | 9—*Pelopidas mathias* | 10—*Pelopidas subochracea* | 11—*Spialia galba* | 12—*Suastus gremius* | 13—*Telicota bambusae* | 14—*Udaspes folus* | 15—*Azanus jesous* | 16—*Azanus ubaldus* | 17—*Azanus uranus* | 18—*Calet decidia* | 19—*Castalius rosimon* | 20—*Catochrysops panormus* | 21—*Catochrysops strabo* | 22—*Chilades lajus* | 23—*Chilades pandava* | 24—*Chilades parrhasius* | 25—*Curetis thetis* | 26—*Euchrysops cnejus* | 27—*Everes lacturuns* | 28—*Freyeria putli* | 29—*Jamides bochus* | 30—*Jamides celeno* | 31—*Lampides boeticus* | 32—*Leptotes plinius* | 33—*Prosotas dubiosa indica* | 34—*Prosotas nora* | 35—*Rathinda amor*. © Authors



Image 36–70. 36—*Spindasis ictis* | 37—*Spindasis schistacea* | 38—*Spindasis vulcanus* | 39—*Talicauda nyseus* | 40—*Tarucus nara* | 41—*Virachola isocrates* | 42—*Zizeeria karsandra* | 43—*Zizina otis* | 44—*Zizula hylax* | 45—*Acraca terpsicore* | 46—*Ariadne merione* | 47—*Ariadne ariadne* | 48—*Byblia ilithyia* | 49—*Charaxes solon* | 50—*Danaus chrysippus* | 51—*Danaus genutia* | 52—*Euploea core* | 53—*Euploea sylvester* | 54—*Euthalia aconthea* | 55—*Hypolimnas bolina* | 56—*Hypolimnas misippus* | 57—*Junonia almana* | 58—*Junonia atlites* | 59—*Junonia hierta* | 60—*Junonia iphita* | 61—*Junonia lemonias* | 62—*Junonia orithya* | 63—*Lethe europa* | 64—*Melanitis leda* | 65—*Moduza procris* | 66—*Mycalesis mineus* | 67—*Mycalesis perseus* | 68—*Neptis hylax* | 69—*Neptis jumbah* | 70—*Phaedyma columella*. © Authors

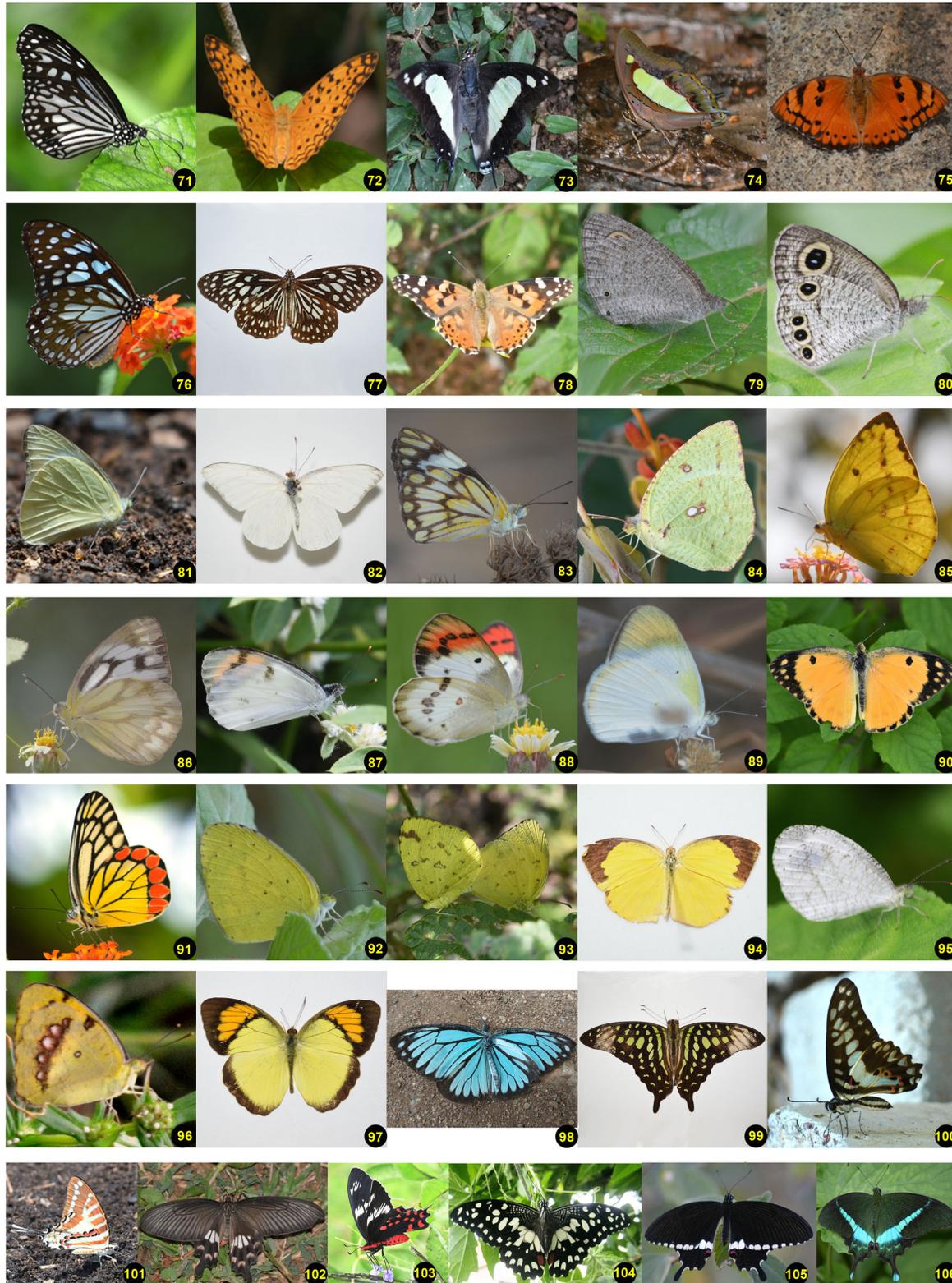


Image 71–106. 71—*Parantica aglea* | 72—*Phalantha phalantha* | 73—*Polyura agraria* | 74—*Polyura athamas* | 75—*Symphaedra nais* | 76—*Tirumala limniace* | 77—*Tirumala septentrionis* | 78—*Vanessa cardui* | 79—*Ypthima asterope* | 80—*Ypthima baldus* | 81—*Appias albina* | 82—*Appias libythea* | 83—*Belenois aurota* | 84—*Catopsilia pyranthe* | 85—*Catopsilia Pomona* | 86—*Cepora nerissa* | 87—*Colotis aurora* | 88—*Colotis danae* | 89—*Colotis etrida* | 90—*Colotis fausta* | 91—*Delias eucharis* | 92—*Eurema brigitta* | 93—*Eurema hecabe* | 94—*Eurema laeta* | 95—*Leptosia nina* | 96—*Ixias marianne* | 97—*Ixias pyrene* | 98—*Pareronia hippia* | 99—*Graphium agamemnon* | 100—*Graphium doson* | 101—*Graphium nomius* | 102—*Pachliopta aristolochiae* | 103—*Pachliopta hector* | 104—*Papilio demoleus* | 105—*Papilio polytes* | 106—*Papilio crino*. © Authors



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