

Research Article

Butterflies (Lepidoptera: Rhopalocera) in and around the Unakoti Archaeological Site with 59 new additions to the Butterfly Fauna of Tripura, North-eastern India

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ABSTRACT

The authors have surveyed different habitats in and around the Unakoti Archaeological Site and documented a total of 216 species classified under 6 families, 23 subfamilies and 126 genera of the order Lepidoptera. The study was conducted from 2016 to 2020, covering different seasons namely pre-monsoon (Jan-Apr), monsoon (May-Aug) and post-monsoon (Sep-Dec) respectively. The study reports 2 species under schedule I, 25 species under schedule II, and 5 species under schedule IV of the Indian Wildlife (Protection) Act 1972. This study also documented seasonal diversity and habitat-wise occurrence of butterflies in and around the Unakoti Archaeological Site. During the study, 59 butterfly species were recorded as new additions to the butterfly fauna of Tripura. High-quality photographs of all the butterfly species documented during the study have been included in this paper.

Key words: Archaeological Site, Butterfly, Diversity, Habitat, Lepidoptera, Tripura, Unakoti.

INTRODUCTION

Butterflies are flagship species in terms of insect conservation and one of the most popular insects because of their fascinating beauty and attractive colors, good pollinators and very sensitive to environmental factors such as temperature, humidity, rainfall (Ribeiro and Freitas, 2012); (Hill *et al.*, 2002). Butterfly lead migration, if any minor changes occur in their natural habitat due to anthropogenic factors and considered as umbrella species in the field of conservation planning and management (Blair, 1999); (Mennechez *et al.*, 2003); (Betrus *et al.*, 2005). Butterfly diversity has a strong relation with plant diversity (Erhardt, 1985); (Thomas and Malorie, 1985); (Leps and Spitzer, 1990); (Spitzer *et al.*, 1997), habitat complexity (Molina and Palma, 1996), landscape structure (Wood and Samways, 1992), topographic and moisture gradients (Kremen, 1992), and climate (Pollard and Yates, 1993); (Parmesan, 1996). Approximately, 17,200 species of butterfly found throughout the world, of which 1,501 species of the butterfly are known from India (Kunte, 2000). India has rich butterfly diversity but recently many species become very rare and some are on the edge of extinction due to some anthropogenic disturbances like habitat destruction, use of pesticides and weedicides, fire (Sharma and Joshi, 2009). Due to the confluence of the Indo-Malayan, Indo-Chinese, and Indian biogeographical realms and a significant presence of the Brahmaputra river passing through Assam which serves as a crucial barrier to the gene flow from the Indo Chinese sub-region to the Indian sub-region, the North-eastern region of India provides a plethora of habitats

for highly endemic diverse biota (Chatterjee *et al.*, 2006); (Datta-Roy *et al.*, 2012). A high level of species richness and considerable endemism at the subspecies level makes this region important, from the Lepidoptera biodiversity study and conservation point of view (Kunte *et al.*, 2012). A critical review of the existing literature confirms that, except a few earlier works most of the studies on Lepidoptera were confined only within the protected areas of Tripura, North-eastern India (Majumder *et al.*, 2012); (Majumder *et al.*, 2013); (Lodh and Agarwala, 2016); (Agarwala and Majumder, 2019). As a result potential regions across the state remained vastly unexplored and yet to be studied. A recent re-discovery of Looped Threering (*Ypthima watsoni*) from the hills of Jampui, North Tripura, to the Country after an astonishing interval of 62 years further cements the aforesaid statement (Bhowmik *et al.*, 2020). Although resides within the pristine natural vegetations of the moist deciduous forest, this highly alluring tourist attraction and its scenic landscape with a rich stream system which may provide significant habitats for butterflies, the Unakoti Archaeological Site and its adjacent areas remain untouched by previous authors in comparison to other regions of the state as far as studies on Lepidoptera is concerned. Hence it was felt necessary to study butterfly diversity in and around this potentially diverse and highly anthropogenic activity prone area (Banik *et al.*, 2018). We hope our present work will provide baseline information on butterfly diversity and will be useful in the conservation of the rich biodiversity of the Unakoti Archaeological Site, a mysterious sculpture etched abode of one less than a crore Hindu deity.

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Figure 1. Some unique bas relief sculptures of Unakoti Archaeological Site

History of Unakoti Archaeological Site:

The Unakoti Archaeological Site is a Shiva pilgrimage situated in Kailasahar Sub-Division of Unakoti District, Tripura. The name 'Unakoti' derived from the thought that there was an assembly of one less than a crore (Ten Million) gods and goddesses. The captivating view of gigantic bas relief sculptures carved on vertical rock cliffs displays Lord Shiva's head, Devi, a group of rock-cut Ganesha figures along with two standing images of elephant-headed figures and an image of Vishnu (Figure 1). Apart from the large ones, some loose sculptures kept in a sculpture shade made at the top of the hill. According to the archaeological department, the Shiva idols of Unakoti date back to the 8th or 9th century. Some suggest that this holy place was the Shiva-Tirtha of the Palaera. An important festival of the state followed by the grandiose 'Ashokastami Mela (Fair)' is held at Unakoti every year in the month of March-April where thousands of religious people perform various rituals and take a holy dip in the water of the streams. With its distinct elegance of crude artistry, the Unakoti Archaeological Site is one of its kinds in India (ASI, 2020).

MATERIALS AND METHOD

Study Area:

The study area concentrates on the Unakoti Archaeological Site as shown in Figure 2. The Archaeological Site (24°19'1.16" N, 92° 3'59.65" E) falls under Unakoti district, situated in the extreme North-eastern edge of the State of Tripura. With a mean temperature of above 24°C and annual rainfall above 2000 mm, the Unakoti district mostly covered with tropical moist deciduous forests (Reddy *et al.*, 2015; ISFR, 2019). Specific study sites were selected to include different potential habitats

present within the study area. The study sites comprise:

1. Main archaeological site, which is mostly covered with moist deciduous trees. An abundance of remarkable bas relief sculptures of astonishing heights that may reach approximately up to 40 feet is the major tourist attraction. The scattered sculpture display areas are connected with stairs and narrow passages made for visitors. The largest sculpture and the prime attraction is of Lord Shiva in front of which arrangements for worshipping the deity along with traditional rituals of native tribes can be observed throughout the year. A narrow waterfall seems to appear through a crevice just next to the main sculpture cliff and passes down across the site between the valleys and merges with the nearby rivulet. This study site is most influenced by anthropogenic interference. Yet a significant amount of leftovers from the worshipping rituals within the site and the presence of pebble adorned stream scratching through the lush green valley attract a fair population of butterflies.

2. The 1 km long crucial road stretch that connects the main Archaeological Site to the adjacent highway. This particular area is mostly covered by mixed moist deciduous trees which are lined on either side of the road. The presence of small hill streams, passing along the road-stretch attracts a significant amount of butterfly species, despite the notable magnitude of disturbance caused by human interference.

3. Minuscule crisscrossing stream stretches and small waterfalls that meet the rivulet flowing down the main archaeological site, penetrating through the tree lines, are the humble roaming grounds of countless butterfly species. Forest undergrowth with an abundance of host and nectar plants growing along the streams and less human interference enrich this study site with several butterfly species.

4. The adjacent portion of the lowland village area

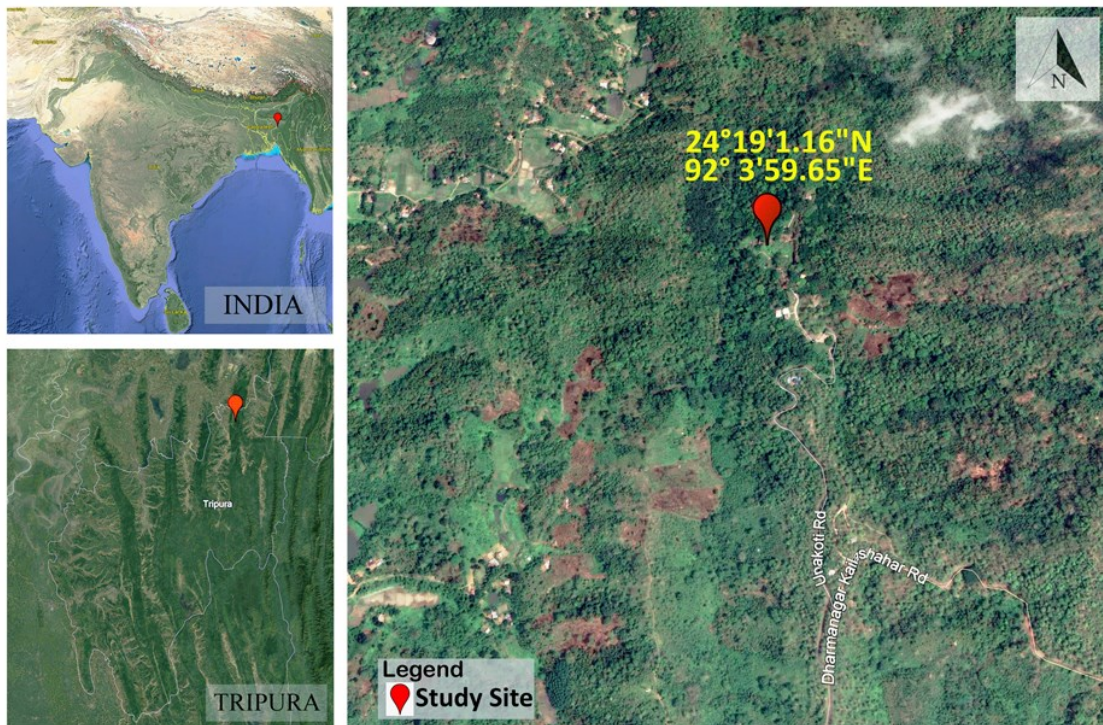


Figure 2. Map showing locality of the study site (Map Data: 2020 © Google Earth Pro)

named Chini Bagan serves as a potential study site. The village area, which has a small stretch of a stream, possesses suitable habitats for many butterfly species, which commonly occur in and around human habitation, agricultural lands and garden vegetations.

Habitat Classification:

To evaluate butterfly diversity with variability, the following four types of butterfly habitats were identified in the study area (Figure 3).

1. Forest Habitat: This habitat includes areas like forest interior, tracks and paths located in the forest area, forest edges, path going along forest streams, and all types of lower to higher bushes, herbs, and flowering plants found in the study area.

2. Riverine Habitat: This habitat includes all types of rivulets including hill streams, forested streams, and small-sized waterfalls, along with supportive vegetations.

3. Agricultural Landscape: These are man-made habitats consisting of agricultural plots used to cultivate various crops like rice, corn, betel nut, banana, etc. Agriculture in the hilly areas is mainly dependent on Jhum cultivation. During the latent period of cultivation, most of these agricultural fields are dominated by different types of grasses.

4. Human habitat: Being a notable tourist spot within the state, the Unakoti Archaeological Site is almost always visited by either tourists or natives. So, it was decided to include the sacred area of the Archaeological Site under this habitat. This habitat also incorporates vegetation along the 1-km stretch of entrance road used for public transportation to the main archaeological site. The village named Chini Bagan is also a part of this habitat, which comprises garden vegetations.

Sampling period and time:

This paper is based on the observation made from the sampling period of four years (Jan 2016-Jan 2020) in



Figure 3. Showing Different Habitats within Study area viz. Forest Habitat (A, B); Riverine Habitat (C, D); Human Habitat (E, F); and Agricultural Landscape (G, H)

and around the butterfly’s habitat of the Unakoti Archaeological Site. During the study, each classified habitats were sampled twice a month and observation of butterflies was made from early morning (8.00 AM) to evening (4.00 PM) and one hour also conducted in the late evening (4 PM-5 PM) to observe dawn visitors and twilight skippers (Awl, Awlet, Awlking, etc.). Sampling period divided into three seasons namely pre-monsoon (January-April), monsoon (May-August), and post-monsoon (September-December).

Sampling Techniques:

All the observations made in this study are based on a fairly simple technique. During each survey, documentation of butterflies was conducted by direct observation, random walks and opportunistic sightings in the field comprising of the four classified habitats (Murugesan *et al.*, 2013). When researching habitats, the main focus was to observe butterflies in areas where there was a higher likelihood of sighting. These areas normally included mud-puddling patches, supportive vegetation like nectar plants, host plants, sunny patches used for basking behaviour, etc. Paths used by locals leading to the forest were also observed extensively to study butterflies near village areas. Each record was noted in the field notebook along with the common names (scientific name if possible), date of record, behaviour and the associated plant (if any) for detailed study and analysis. Each butterfly was photographed using digital cameras in the field for references.

All the photographs taken on the field were cross-checked with the original taxonomic works and field guides (Evans, 1927,1932,1949); (Moore, 1890–1892, 1893–1896, 1896–1899, 1899–1900, 1901-1903,

1903–1905); (Swinhoe, 1905–1910, 1910–1911, 1911–1912, 1912–1913); (Talbot, 1947); (Wynter-Blyth, 1957). An attempt has been made to use the latest taxonomic literature to follow an updated checklist in the reframing of either genus or species level (Toussaint *et al.*, 2015). All the subspecies listed in this paper are based on the distribution of subspecies in Indian literature (Van Gasse, 2013); (Varshney and Smetacek, 2015). The common English names of the butterflies are used in this paper following A Synoptic Catalogue of the Butterflies of India by R.K. Varshney and Peter Smetacek (Varshney and Smetacek, 2015).

RESULTS

The annotated checklist of butterflies recorded in the study area is presented in table 3. The checklist is organised alphabetically by butterfly families and subfamilies. Within each subfamilies, the genera and species are organised alphabetically by their tribes. This study documented a total of 216 butterflies belonging to 6 families, 23 subfamilies, and 127 genera. Out of these, 57 species belong to both Family Hesperidae and Lycaenidae, 76 species from Nymphalidae, 11 species from Papilionidae, 14 species from Pieridae and 1 species from the family Riodinidae. With 76 species the family Nymphalidae is the most species-rich family which consists of 35.18% of the total number of species observed. Family Riodinidae came out to be the least-species rich family with only 1 species (0.46% of total species) (Table 1).

Of 216 species of butterflies found in the entire study, 2 species belong to schedule I, 25 species under schedule II, and 5 species from schedule IV of the Indian Wildlife Protection Act (1972) were recorded

Table 1. Detailed taxonomic overview of butterflies of Unakoti Archaeological Site

Family	Number of subfamilies	Number of genera	Number of species
Hesperidae	3 (13.04%)	35 (27.55%)	57 (26.38%)
Lycaenidae	6 (26.08%)	41 (32.28%)	57 (26.38%)
Nymphalidae	10 (43.47%)	38 (29.92%)	76 (35.18%)
Papilionidae	1 (4.34%)	5 (3.93%)	11 (5.09%)
Pieridae	2 (8.69%)	7 (5.51%)	14 (6.48%)
Riodinidae	1 (4.34%)	1 (0.78%)	1 (0.46%)
Total: 6	23 (100%)	127 (100%)	216 (100%)

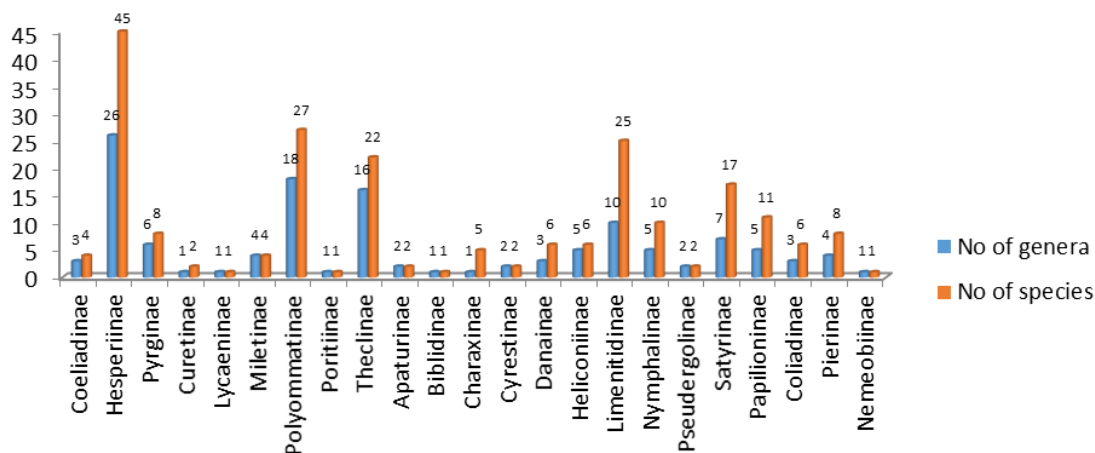


Figure 4. Subfamily wise diversity of butterflies of Unakoti Archaeological Site

Table 2. Butterflies legally protected by the Indian Wildlife (Protection) Act, 1972, reported from the Unakoti Archaeological Site

Schedule I	Schedule II	Schedule IV
<p>Lycaenidae <i>Hypolycaena othona othona</i></p> <p>Nymphalidae <i>Discophora sondaica zal</i></p>	<p>Lycaenidae <i>Anthene lycaenina lycambes</i> <i>Araotes lapithis lapithis</i> <i>Ionolyce helicon merguiana</i> <i>Jamides pura pura</i> <i>Lampides boeticus</i> <i>Logania distanti massalia</i> <i>Poritia hewitsoni hewitsoni</i> <i>Rapala suffusa suffusa</i> <i>Rapala varuna orseis</i> <i>Spindasis lohita himalayanus</i> <i>Suasa lisides lisides</i> <i>Zinaspa todara distorta</i></p> <p>Nymphalidae <i>Athyma asura asura</i> <i>Athyma kanwa phorkys</i> <i>Athyma ranga ranga</i> <i>Charaxes delphis delphis</i> <i>Charaxes solon sulphureus</i> <i>Chersonesia intermedia rahrioides</i> <i>Euripus nyctelius nyctelius</i> <i>Melanitis zitenius zitenius</i> <i>Mycalesis gotama charaka</i> <i>Neptis magadha khasiana</i> <i>Parthenos sylvia gambrisius</i> <i>Tanaecia lepidea lepidea</i></p> <p>Pieridae <i>Appias albina darada</i></p>	<p>Hesperiidae <i>Baoris farri</i> <i>Pelopidas assamensis</i> <i>Polytre- mis lubricans lubricans</i></p> <p>Nymphalidae <i>Euploea mulciber mulciber</i> <i>Euthalia lubentina lubentina</i></p>
Total no. of protected species under WPA Schedule I : 2	Total no. of protected species under WPA Schedule II : 25	Total no. of protected species under WPA Schedule IV : 5

(Anonymous, 1997) (Table 2). A total of 59 Species out of 216 butterflies are documented for the first time in the state and are considered as new additions to the existing list of butterfly fauna of Tripura (Table 3) (Nandi and Varshney, 1988); (Majumder *et al.*, 2012); (Majumder *et al.*, 2013); (Lodh and Agarwala, 2015); (Lodh and Agarwala, 2016); (Das, 2017); (Nair *et al.*, 2018); (Agarwala and Majumder, 2019); (Bhowmik *et al.*, 2020). The new additions represent 24 species from the family Hesperiiidae, 18 species from Lycaenidae, 16 species from Nymphalidae, and only 1 species from Papilionidae (Table 3). With 45 butterfly species from 26 genera, Hesperiiinae emerged as the most diverse sub-family in this study (Figure 4).

8 Out of the total 126 genera exhibit 5 or more species where the genus *Papilio* consists maximum of 7 number of species (Figure 5).

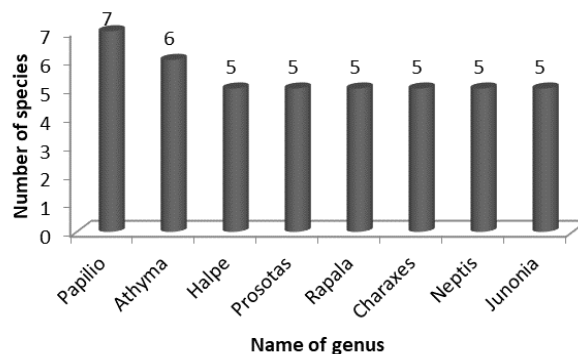


Figure 5. Most species rich genera of the Unakoti Archaeological Site. All genera with five or more species recorded are shown.

Table 3. Butterflies of the Unakoti Archaeological Site with habitat, sighting period, and relative status

Sl. No.	Common Name	Scientific Name	Habitat	Sighting Period	Relative Status
Family : HesperIIDae, Subfamily : Coeliadinae					
1.	Brown Awl	<i>Badamia exclamationis</i> (Fabricius, 1775)	RH	vii	VR
2.	Orange Striped Awlet*	<i>Burara harisa harisa</i> (Moore, [1866])	FH	xii	VR
3.	Common Awl*	<i>Hasora badra badra</i> (Moore, [1858])	FH	viii	VR
4.	Common Banded Awl*	<i>Hasora chromus chromus</i> (Cramer, [1780])	FH	vi, vii	VR
Family : HesperIIDae, Subfamily : Hesperiiinae					
5.	Grey Scrub Hopper*	<i>Aeromachus jhora</i> (de Niceville, 1885)	AL	vii	VR
6.	Pygmy Scrub Hopper	<i>Aeromachus pygmaeus</i> (Fabricius, 1775)	AL, HH, FH	i-xii	UC
7.	Chocolate Demon	<i>Ancistroides nigrita diocles</i> (Moore, [1866])	FH, RH, HH	iii-xi	UC
8.	Forest Hopper*	<i>Astictopterus jama olivascens</i> Moore, 1878	RH	vii	VR
9.	Wax Dart	<i>Cupitha purreea</i> (Moore, 1877)	FH, RH	ii-vii	NR
10.	White-tipped Palm-redeye*	<i>Erionota apex</i> Semper, 1892	RH	ii-iv	VR
11.	Banana Skipper*	<i>Erionota torus</i> Evans, 1941	AL, HH	vii, xii	R
12.	Gold-spotted Ace	<i>Halpe aucma</i> Swinhoe, 1893	RH, HH	ii, iii	R
13.	Elwes's Ace	<i>Halpe cf. filda</i> Evans, 1949	RH	ii	VR
14.	Moore's Ace	<i>Halpe porus</i> (Mabille, [1877])	RH, FH	v-viii	R
15.	Confusing Ace*	<i>Halpe wantona</i> Swinhoe, 1893	RH, HH	ii	VR
16.	Banded Ace	<i>Halpe zema zema</i> (Hewitson, 1877)	RH, FH, HH	iii-vi	NR
17.	Chestnut Bob	<i>Iambrix salsala salsala</i> (Moore, [1866])	RH, FH, AL, HH	i-xii	C
18.	Dark Velvet Bob	<i>Koruthaialos butleri</i> (de Niceville, [1884])	FH	vii	VR
19.	Bright Red Velvet Bob	<i>Koruthaialos sindu monda</i> Evans, 1949	RH	iii-vii	R
20.	Common Redeye	<i>Matapa aria</i> (Moore, [1866])	RH, FH, HH	vii-xii	NR
21.	Darkbrand Redeye*	<i>Matapa cresta</i> Evans, 1949	RH, HH	iii-vii	VR
22.	Black-veined Redeye*	<i>Matapa sasivarna</i> (Moore, [1866])	RH, HH	iii-vii	R
23.	Restricted Demon	<i>Notocrypta curvifascia curvifascia</i> (C. and R. Felder, 1862)	RH, FH, HH, AL	iii-xi	UC
24.	Spotted Demon	<i>Notocrypta feisthamelii alysos</i> (Moore, [1866])	RH, HH, FH	iii-v	R
25.	Common Banded Demon	<i>Notocrypta paralysos asawa</i> Fruhstorfer, 1911	RH, FH	ix-xii	UC
26.	Light Straw Ace	<i>Pithauria stramineipennis</i> Wood-Mason and de Niceville, [1887]	RH	iii-v	VR
27.	Coon*	<i>Psolos fuligo subfasciatus</i> (Moore, 1878)	HH	viii-xii	NR
28.	Swinhoe's Forest Bob*	<i>Scobura isota</i> (Swinhoe, 1893)	RH	iv, vii	VR
29.	Grass Bob	<i>Suada swerga swerga</i> (de Niceville, [1884])	RH	ii-iv	R
30.	Grass Demon	<i>Udaspes folus</i> (Cramer, [1775])	RH, HH, AL	i-xii	UC

Table 3 continued in next page

31.	Purple-and-gold Flitter*	<i>Zographetus satwa</i> (de Niceville, [1884])	FH	xi	VR
32.	Small Paintbrush Swift*	<i>Baoris chapmani</i> Evans, 1937	RH,FH,HH	ii-iv, xi, xii	UC
33.	Paintbrush swift	<i>Baoris farri</i> (Moore, 1878)	RH,FH	vii-xi	NR
34.	Black Paintbrush Swift*	<i>Baoris unicolor</i> Moore, [1884]	RH,FH	vii	VR
35.	Rice Swift	<i>Borbo cinnara</i> (Wallace, 1866)	AL,HH	vii-xii	NR
36.	Colon Swift*	<i>Caltoris cahira austeni</i> (Moore, [1884])	RH,AL,HH	xi, xii	NR
37.	Common Wight	<i>Iton semamora semamora</i> (Moore, [1866])	FH	iii, iv	R
38.	Ceylon Swift	<i>Parnara bada</i> (Moore, 1878)	FH,HH, AL	x-xii	R
39.	Evans' Swift*	<i>Parnara ganga</i> Evans, 1937	FH,HH, AL	x-xii	R
40.	Obscure Branded Swift	<i>Pelopidas agna agna</i> (Moore, [1866])	FH,HH,AL	viii-xii	UC
41.	Great Swift	<i>Pelopidas assamensis</i> (de Niceville, 1882)	RH,FH	xi	VR
42.	Conjoined Swift	<i>Pelopidas conjuncta conjuncta</i> (Herrich-Schaffer, 1869)	RH, AL	vii-xi	R
43.	Variable Swift	<i>Pelopidas mathias mathias</i> (Fabricius, 1798)	AL, HH	vii-xii	UC
44.	Contiguous Swift*	<i>Polytremis lubricans lubricans</i> (Herrich-Schaffer, 1869)	FH,AL	xi, xii	R
45.	Plain Palm Dart*	<i>Cephrenes acalle oceanica</i> (Mabille, 1904)	RH,AL,HH	i-iii, x-xii	R
46.	Common Dartlet*	<i>Oriens gola pseudolus</i> (Mabille, 1883)	AL,HH, FD	ix-xii	NR
47.	Ceylon Dartlet*	<i>Oriens goloides</i> (Moore, [1881])	AL, HH, FH	viii	R
48.	Dark Palm Dart	<i>Telicota bambusae</i> (Moore, 1878)	RH, FH, HH	vi-xii	NR
49.	Crested Palm Dart*	<i>Telicota ohara jix</i> Evans, 1949	RH	i-iii	VR
Family : Hesperiiidae, Subfamily : Pyrginae					
50.	Indian Skipper	<i>Spialia galba galba</i> (Fabricius, 1793)	AL,HH	iv-viii	NR
51.	Common Spotted Flat*	<i>Celaenorrhinus leucocera</i> (Kollar, [1844])	FH	xi	VR
52.	Fulvous Pied Flat	<i>Pseudocoladenia dan fabia</i> (Evans, 1949)	RH,AL, HH,FH	i-xii	UC
53.	Common Small Flat	<i>Sarangesa dasahara dasahara</i> (Moore, [1866])	FH,RH	i-xii	UC
54.	Chestnut Angle	<i>Odontoptilum angulata angulata</i> (C.and R. Felder, 1862)	RH,AL,FH	i-xii	NR
55.	Large Snow Flat	<i>Tagiades gana athos</i> Ploetz, 1884	RH,FH	i, iv, viii, xii	R
56.	Suffused Snow Flat	<i>Tagiades japetus ravi</i> (Moore, [1866])	RH, FH,HH	i-xii	C
57.	Water Snow Flat*	<i>Tagiades litigiosa litigiosa</i> Moschler, 1878	RH,FH	vii-xi	NR
Family : Lycaenidae, Subfamily : Curetinae					
58.	Angled Sunbeam*	<i>Curetis acuta dentata</i> Moore, 1879	HH	iii	VR
59.	Bright Sunbeam*	<i>Curetis bulis bulis</i> (Westwood, [1851])	HH	ix	VR

Table 3 continued in next page

Family : Lycaenidae, Subfamily : Lycaeninae					
60.	Purple Sapphire	<i>Heliophorus epicles latilimbata</i> (Fruhstorfer, 1908)	RH,FH	iii-xii	NR
Family : Lycaenidae, Subfamily : Miletinae					
61.	Common Darkie*	<i>Allotinus unicolor continentalis</i> Fruhstorfer, 1913	RH	iii, iv, x, xii	R
62.	Dark Mottle*	<i>Logania distanti massalia</i> Doherty, 1891	FH	ii	VR
63.	Common Brownie	<i>Miletus chinensis assamensis</i> (Doherty, 1891)	RH,FH	vi	VR
64.	Common Apefly	<i>Spalgis epius epius</i> (Westwood, [1851])	HH, FH	i-xii	UC
Family : Lycaenidae, Subfamily : Polyommattinae					
65.	Ciliate Blue	<i>Anthene emolus emolus</i> (Godart, [1824])	RH,HH,FH	i-xii	UC
66.	Pointed Ciliate Blue	<i>Anthene lycaenina lycambes</i> (Hewitson, [1878])	FH	vi, xi	VR
67.	Common Hedge Blue*	<i>Acytolepis puspa gisca</i> (Fruhstorfer, 1910)	RH	viii	VR
68.	Common Pierrot	<i>Castalius rosimon rosimon</i> (Fabricius, 1775)	AL,FH,HH	i-xii	UC
69.	Forgetmenot	<i>Catochrysops strabo strabo</i> (Fabricius, 1793)	RH,AL	i-v	UC
70.	Plain Hedge Blue*	<i>Celastrina lavendularis limbata</i> (Moore, 1879)	RH	iii	VR
71.	Lime Blue	<i>Chilades lajus lajus</i> (Stoll, [1780])	RH,AL,HH	i-xii	UC
72.	Pointed Lineblue*	<i>Ionolyce helicon merguiana</i> (Moore, 1884)	RH	v-xi	NR
73.	Metallic Cerulean	<i>Jamides alecto alocina</i> Swinhoe, 1915	RH,FH,HH	iv-xii	UC
74.	Dark Cerulean	<i>Jamides bochus bochus</i> (Stoll, [1782])	RH,FH,HH	i-xii	UC
75.	Common Cerulean	<i>Jamides celeno celeno</i> (Cramer, [1775])	RH,FH,HH	i-xii	UC
76.	White Cerulean*	<i>Jamides pura pura</i> (Moore, 1886)	RH,HH	iv-xii	R
77.	Pea Blue	<i>Lampides boeticus</i> (Linnaeus, 1767)	HH	i-xii	UC
78.	Zebra Blue	<i>Leptotes plinius plinius</i> (Fabricius, 1793)	HH	i-xii	UC
79.	Malayan	<i>Megisba malaya sikkima</i> Moore, 1884	RH,FH	i-xii	UC
80.	Pale Fourlineblue*	<i>Nacaduba hermus nabo</i> Fruhstorfer, 1916	RH	i	VR
81.	Transparent Sixlineblue	<i>Nacaduba kurava euplea</i> Fruhstorfer, 1916	RH	v	VR
82.	Quaker	<i>Neopithecops zalmora zalmora</i> (Butler, [1870])	FH,RH	i-xii	UC
83.	Dingy Lineblue*	<i>Petrelaea dana</i> (de Niceville, [1884])	HH	vi	VR
84.	Bhutya Lineblue	<i>Prosotas bhutea</i> (de Niceville, [1884])	RH	x	VR
85.	Tailless Lineblue*	<i>Prosotas dubiosa indica</i> (Evans, [1925])	HH	vi	VR
86.	Banded Lineblue*	<i>Prosotas lutea sivoka</i> (Evans, 1910)	RH	vi	VR
87.	Common Lineblue	<i>Prosotas nora nora</i> (C. Felder, 1860)	RH,AL,HH, FH	i-xii	C
88.	Margined Lineblue*	<i>Prosotas pia marginata</i> Tite, 1963	FH	xii	VR
89.	Pale Grass Blue	<i>Pseudozizeeria maha maha</i> (Kollar, [1844])	AL,HH	i-xii	C
90.	Dark Grass Blue	<i>Zizeeria karsandra</i> (Moore, 1865)	AL,HH	i-xii	UC

Table 3 continued in next page

91.	Lesser Grass Blue	<i>Zizina otis sangra</i> (Moore,[1866])	AL,HH	i-xii	C
Family : Lycaenidae, Subfamily : Poritiinae					
92.	Common Gem	<i>Poritia hewitsoni hewitsoni</i> Moore, [1866]	RH,FH	i-xii	NR
Family : Lycaenidae, Subfamily : Theclinae					
93.	Silverstreak Blue	<i>Iraota timoleon timoleon</i> (Stoll, [1790])	RH,FH	v-x	R
94.	Long-banded Silverline	<i>Spindasis lohita himalayanus</i> (Moore, 1884)	RH,AL,FH	i-xii	NR
95.	Club Silverline	<i>Spindasis syama peguanus</i> (Moore, 1884)	HH	vii	VR
96.	Centaur Oakblue	<i>Arhopala centaurus pirithous</i> (Moore, [1884])	HH,FH	iv-vii	R
97.	Variegated Plushblue*	<i>Flos adriana</i> (de Niceville, [1884])	RH,FH	iii	VR
98.	Common Acacia Blue	<i>Surendra quercetorum quercetorum</i> (Moore, [1858])	FH	i-xii	NR
99.	Silver Streaked Acacia Blue	<i>Zinaspia todara distorta</i> (de Niceville, 1887)	FH	v	VR
100.	Common Tinsel	<i>Catapaecilma major anais</i> Fruhstorfer, 1915	RH,FH	i-v	NR
101.	Common Imperial	<i>Cheritra freja evansi</i> Cowan, 1965	RH,FH	iv,xii	R
102.	Red Imperial	<i>Suasa lisides lisides</i> (Hewitson, [1863])	FH	vi,xi	VR
103.	Witch*	<i>Araotes lapithis lapithis</i> (Moore, [1858])	FH	vii,xi	VR
104.	Scarlet Flash*	<i>Rapala dieneces dieneces</i> (Hewitson, [1878])	FH	xii	VR
105.	Slate Flash	<i>Rapala manea schistacea</i> (Moore, 1879)	HH,FH	i-xii	UC
106.	Copper Flash	<i>Rapala pheretima petosiris</i> (Hewitson, [1863])	RH,FH	ii-iv	UC
107.	Suffused Flash	<i>Rapala suffusa suffusa</i> Moore, 1878	FH	vii,xi	VR
108.	Indigo Flash*	<i>Rapala varuna orseis</i> (Hewitson, [1863])	FH	xi	VR
109.	Common Tit	<i>Hypolycaena erylus himavantus</i> Fruhstorfer, [1912]	RH,HH,FH,AL	i-iv, ix-xii	UC
110.	Orchid Tit	<i>Hypolycaena othona othona</i> Hewitson, [1865]	RH	vii	VR
111.	Fluffy Tit	<i>Zeltus amasa amasa</i> (Hewitson, [1865])	RH	vi,vii	R
112.	Mandarin blue*	<i>Charana mandarina mandarina</i> (Hewitson, [1863])	FH	vi	VR
113.	Yamfly	<i>Loxura atymnus continentalis</i> Fruhstorfer, [1912]	RH,HH,FH	i-xii	UC
114.	Chocolate Royal	<i>Remelana jangala ravata</i> (Moore, [1866])	RH,HH,FH	x-xii	NR
Family :Nymphalidae, Subfamily : Apaturinae					
115.	Courtesan	<i>Euripus nyctelius nyctelius</i> (Doubleday, 1845)	RH	xi	VR
116.	Black Prince	<i>Rohana parisatis parisatis</i> (Westwood, [1851])	RH	ii	VR
Family :Nymphalidae, Subfamily : Biblidinae					
117.	Common Castor	<i>Ariadne merione tapestrina</i> (Moore, 1884)	HH,AL	x-xii	R

Table 3 continued in next page

Family :Nymphalidae, Subfamily : Charaxinae					
118.	Pallid Nawab	<i>Charaxes arja</i> C. and R. Felder, [1867]	RH	vii-xii	NR
119.	Tawny Rajah	<i>Charaxes bernardus hierax</i> C. and R. Felder, [1867]	RH	i-xii	UC
120.	Indian Nawab	<i>Charaxes bharata</i> C. and R. Felder, [1867]	RH	i-xii	UC
121.	Jewelled Nawab	<i>Charaxes delphis delphis</i> Doubleday, 1843	RH,HH	iv	VR
122.	Black Rajah	<i>Charaxes solon sulphureus</i> Rothschild, 1900	RH,HH	i-xii	NR
Family :Nymphalidae, Subfamily : Cyrestinae					
123.	Wavy Maplet*	<i>Chersonesia intermedia rahrioides</i> Moore, [1899]	RH,FH	vi,xi,xii	VR
124.	Common map*	<i>Cyrestis thyodamas thyodamas</i> Doyere, [1840]	RH	ii,vi	VR
Family :Nymphalidae, Subfamily : Danainae					
125.	Plain Tiger	<i>Danaus chrysippus chrysippus</i> (Linnaeus, 1758)	AL,HH	xi, xii	VR
126.	Common Tiger	<i>Danaus genutia genutia</i> (Cramer, [1779])	AL,FH,RH	i-xii	UC
127.	Common Crow	<i>Euploea core core</i> (Cramer, [1780])	HI, FH	i-xii	UC
128.	King Crow	<i>Euploea klugii klugii</i> Moore, [1858]	HI,FH	ii-viii	R
129.	Striped Blue Crow	<i>Euploea mulciber mulciber</i> (Cramer, [1777])	HI,FH	ii-vi	R
130.	Glassy Tiger	<i>Parantica aglea melanoides</i> Moore, 1883	FH,RH	iii-vii	R
Family :Nymphalidae, Subfamily : Heliconiinae					
131.	Tawny Coster	<i>Acraea terpsicore</i> (Linnaeus, 1758)	AL	iv	VR
132.	Red Lacewing	<i>Cethosia biblis tisamena</i> Fruhstorfer, 1912	FH	x	VR
133.	Leopard Lacewing	<i>Cethosia cyane cyane</i> (Drury, [1773])	HH,FH	iii-viii	NR
134.	Common Leopard	<i>Phalanta phalantha phalantha</i> (Drury, [1773])	FH,HH	i-xii	UC
135.	Vagrant*	<i>Vagrans egista sinha</i> (Kollar, [1844])	RH,FH	x-xii	R
136.	Cruiser	<i>Vindula erota erota</i> (Fabricius, 1793)	RH, FH	i, ii, ix-xii	NR
Family :Nymphalidae, Subfamily : Limenitidinae					
137.	Red-spot duke	<i>Dophla evelina derma</i> (Kollar, [1848])	RH	viii	VR
138.	Common Baron	<i>Euthalia aconthea garuda</i> (Moore, [1858])	FH,HH	i-xii	UC
139.	Gaudy Baron	<i>Euthalia lubentina lubentina</i> (Cramer, [1777])	RH	viii	VR
140.	Powdered Baron	<i>Euthalia monina kesava</i> (Moore, 1859)	RH,FH	iii-vii	NR
141.	White-edged Blue Baron	<i>Euthalia phemius phemius</i> (Doubleday, [1848])	FH	iv	VR
142.	Plain Earl*	<i>Tanaecia jahnu jahnu</i> (Moore, [1858])	FH	xi	VR
143.	Common Earl	<i>Tanaecia julii appiades</i> (Menetries, 1857)	FH	x-xii	R
144.	Grey Count	<i>Tanaecia lepidea lepidea</i> (Butler, 1868)	RH, FH, HH,AL	i-xii	C
145.	Studded Sergeant	<i>Athyma asura asura</i> Moore, [1858]	RH	xi	VR

Table 3 continued in next page

146.	Colour Sergeant	<i>Athyma nefte inara</i> (Westwood, 1850)	RH,HH,FH	i-xii	UC
147.	Dot-dash Sergeant*	<i>Athyma kanwa phorkys</i> (Fruhstorfer, 1913)	RH,FH	i-iv	NR
148.	Common Sergeant	<i>Athyma perius perius</i> (Linnaeus, 1758)	FH	ii-iv	R
149.	Blackvein Sergeant	<i>Athyma ranga ranga</i> Moore, [1858]	RH,HH, FH	i-xii	UC
150.	Staff Sergeant	<i>Athyma selenophora bahula</i> Moore, 1858	RH	ii-vi	R
151.	Knight	<i>Lebadea martha martha</i> (Fabricius, 1787)	FH	i-xii	UC
152.	Commander	<i>Moduza procris procris</i> (Cramer, [1777])	HH,FH,RH	i-xii	UC
153.	Clear Sailer	<i>Neptis clinia susruta</i> Moore, 1872	RH,HH,FH	i-xii	UC
154.	Common Sailer	<i>Neptis hylas kamarupa</i> Moore, [1875]	HH,FH	i-xii	UC
155.	Chestnut-streaked Sailer	<i>Neptis jumbah jumbah</i> Moore, [1858]	HH,FH	iii	VR
156.	Spotted Sailer*	<i>Neptis magadha khasiana</i> Moore, 1872	FH	vii	VR
157.	Sullied Sailer*	<i>Neptis nata adipala</i> Moore, 1872	HH,RH,FH	ix-xii	R
158.	Common Lascar	<i>Pantoporia hordonia hordonia</i> (Stoll, [1790])	RH,FH	i-xii	UC
159.	Extra Lascar*	<i>Pantoporia sandaka davidsoni</i> Eliot, 1969	FH	iii	VR
160.	Short-banded Sailer*	<i>Phaedyma columella ophiana</i> (Moore, 1872)	HH	ix	VR
161.	Clipper	<i>Parthenos sylvia gambrisius</i> (Fabricius, 1787)	RH,FH	iv-ix	R
Family :Nymphalidae, Subfamily : Nymphalinae					
162.	Great Eggfly	<i>Hypolimnas bolina jacintha</i> (Drury, 1773)	HH,FH,RH, AL	i-xii	UC
163.	Peacock Pansy	<i>Junonia almana almana</i> (Linnaeus, 1758)	AL,RH,HH ,	i-xii	UC
164.	Grey Pansy	<i>Junonia atlites atlites</i> (Linnaeus, 1763)	AL,RH,HH	i-xii	C
165.	Yellow Pansy	<i>Junonia hierta hierta</i> (Fabricius, 1798)	AL,RH,HH	i-xii	C
166.	Chocolate Pansy	<i>Junonia iphita iphita</i> (Cramer, [1779])	AL,RH,HH ,FH	i-xii	C
167.	Lemon Pansy	<i>Junonia lemonias lemonias</i> (Linnaeus, 1758)	AL,RH,HH ,FH	i-xii	C
168.	Orange Oakleaf	<i>Kallima inachus inachus</i> (Doyere, [1840])	RH,FH	ii-x	NR
169.	Blue Admiral*	<i>Kaniska canace canace</i> (Linnaeus, 1763)	RH	ii	VR
170.	Spotted Jester*	<i>Symbrenthia hypselis cotanda</i> Moore, [1875]	RH,FH	iii-v	R
171.	Common Jester	<i>Symbrenthia lilaea khasiana</i> Moore, [1875]	RH,FH,HH	i-xii	UC
Family :Nymphalidae, Subfamily : Pseudergolinae					
172.	Tabby*	<i>Pseudergolis wedah wedah</i> (Kollar, [1844])	RH	iv	VR
173.	Popinjay	<i>Stibochiona nicea nicea</i> (Gray, 1846)	RH,FH	ii-xi	UC
Family :Nymphalidae, Subfamily : Satyrinae					
174.	Common Duffer	<i>Discophora sondaica</i> za/Westwood, [1851]	FH,HH	i-xii	UC
175.	Common Palmfly	<i>Elymnias hypermnestra undularis</i> (Drury, 1773)	AL,HH	i-xii	UC

Table 3 continued in next page

176.	Spotted Palmfly	<i>Elymnias malelas malelas</i> (Hewitson, 1863)	AL,HH,RH	iii, iv	VR
177.	Tiger Palmfly*	<i>Elymnias nesaea timandra</i> Wallace, 1869	AL,HH	iii	VR
178.	Common Evening Brown	<i>Melanitis leda leda</i> (Linnaeus, 1758)	AL,FH,HH	i-xii	UC
179.	Great Evening Brown	<i>Melanitis zitenius zitenius</i> (Herbst, 1796)	AL,FH,HH	ix-xii	NR
180.	Angled Red Forester	<i>Lethe chandica chandica</i> (Moore, [1858])	AL,FH,HH	i-xii	UC
181.	Bamboo Treebrown	<i>Lethe europa niladana</i> Fruhstorfer, 1911	AL,FH,HH	i-xii	UC
182.	Common Red Forester	<i>Lethe mekara zuchara</i> Fruhstorfer, 1911	FH,HH	i-xii	UC
183.	Black Forester*	<i>Lethe vindhya vindhya</i> (C. and R. Felder, 1859)	RH,HH	x-xii	VR
184.	Chinese Bushbrown*	<i>Mycalesis gotama charaka</i> Moore, [1875]	RH	xi	VR
185.	Intermediate Bushbrown*	<i>Mycalesis intermedia</i> (Moore, [1892])	FH	vii	VR
186.	Dark-brand Bushbrown	<i>Mycalesis mineus mineus</i> (Linnaeus, 1758)	AL,HH,RH ,FH	i-xii	C
187.	Long-brand Bushbrown	<i>Mycalesis visala visala</i> Moore, [1858]	AL,HH,FH	i-xii	UC
188.	Nigger	<i>Orosotriaena medus medus</i> (Fabricius, 1775)	AL,HH,RH ,FH	i-xii	UC
189.	Common Fivering	<i>Ypthima baldus baldus</i> (Fabricius, 1775)	AL,HH,RH ,FH	i-xii	C
190.	Common Fourring	<i>Ypthima huebneri</i> Kirby, 1871	AL,HH,FH	i-xii	UC
Family : Papilionidae, Subfamily : Papilioninae					
191.	Tailed Jay	<i>Graphium agamemnon agamemnon</i> (Linnaeus, 1758)	FH,HH	i-xii	UC
192.	Common Peacock*	<i>Papilio bianor gladiator</i> Fruhstorfer, 1902	RH	v	VR
193.	Common Mime	<i>Papilio clytia clytia</i> Linnaeus, 1758	RH	iii	VR
194.	Lime	<i>Papilio demoleus demoleus</i> Linnaeus, 1758	AL,HH,RH ,FH	i-xii	UC
195.	Red Helen	<i>Papilio helenus helenus</i> Linnaeus, 1758	RH	iv-ix	NR
196.	Great Mormon	<i>Papilio memnon agenor</i> Linnaeus, 1758	HH,RH,FH ,AL	i-xii	VC
197.	Yellow Helen	<i>Papilio nephelus chaon</i> Westwood, 1845	HH,RH,FH ,AL	i-xii	VC
198.	Common Mormon	<i>Papilio polytes romulus</i> Cramer, [1775]	HH,RH,FH ,AL	i-xii	C
199.	Common Batwing	<i>Atrophaneura varuna astorion</i> (Westwood, 1842)	RH,FH	iii-ix	NR
200.	Common Rose	<i>Pachliopta aristolochiae aristolochiae</i> (Fabricius, 1775)	AL,HH,RH ,FH	i-xii	UC
201.	Common Birdwing	<i>Troides helena cerberus</i> (C. and R. Felder, 1865)	AL,HH,RH ,FH	i-xii	UC
Family : Pieridae, Subfamily : Coliadinae					
202.	Common Emigrant	<i>Catopsilia pomona pomona</i> (Fabricius, 1775)	AL,HH,RH ,FH	i-xii	VC
203.	Mottled Emigrant	<i>Catopsilia pyranthe pyranthe</i> (Linnaeus, 1758)	AL,HH,RH ,FH	i-xii	C
204.	One-spot Grass Yellow	<i>Eurema andersonii jordani</i> Corbet and Pendlebury, 1932	FH	ix-xii	R

Table 3 continued in next page

205.	Three-spot Grass Yellow	<i>Eurema blanda silhetana</i> (Wallace, 1867)	AL,HH,RH,FH	i-xii	C
206.	Common Grass Yellow	<i>Eurema hecabe hecabe</i> (Linnaeus, 1758)	AL,HH,RH,FH	i-xii	C
207.	Tree Yellow	<i>Gandaca harina assamica</i> Moore, 1906	RH,FH	iii-xi	NR
Family : Pieridae, Subfamily : Pierinae					
208.	Psyche	<i>Leptosia nina nina</i> (Fabricius, 1793)	AL,HH,FH	i-xii	C
209.	Common Albatross	<i>Appias albina darada</i> (C. and R. Felder, [1865])	RH,FH	v-viii	R
210.	Chocolate Albatross	<i>Appias lyncida eleonora</i> (Boisduval, 1836)	AL,HH,FH,RH	i-xii	UC
211.	Striped Albatross	<i>Appias olferna</i> Swinhoe, 1890	FH,HH	i-xii	UC
212.	Yellow Jezebel	<i>Delias agostina agostina</i> (Hewitson, 1852)	RH,FH	i-iii, x-xii	UC
213.	Redspot Jezebel	<i>Delias descombesi descombesi</i> (Boisduval, 1836)	RH,FH,HH	i, ii, ix-xii	UC
214.	Redbase Jezebel	<i>Delias pasithoe pasithoe</i> (Linnaeus, 1767)	RH,HH,FH	i, ii, ix-xii	UC
215.	Indian Cabbage White	<i>Pieris canidia indica</i> Evans, 1926	AL,HH,RH,FH	i-xii	UC
Family : Riodinidae, Subfamily : Nemeobiinae					
216.	Punchinello	<i>Zemerus flegyas indicus</i> Fruhstorfer, 1898	RH,FH,HH,AL	i-xii	C

Note: Species marked with * are new additions to the butterfly fauna of Tripura.

Habitat.

FH = Forest Habitat; RH = Riverine Habitat; AL = Agricultural Landscape; HH = Human Habitat

Sighting Period.

i = January; ii = February; iii = March; iv = April; v = May; vi = June; vii = July; viii = August; ix = September; x = October; xi = November; xii = December

Relative Status.

VC = Very Common (The frequency of sighting was $\geq 85\%$ out of the total no. of sampling visits);

C = Common (The frequency of sighting was between 84% to 60% out of the total no. of sampling visits);

UC = Uncommon (The frequency of sighting was between 59% to 35% out of the total no. of sampling visits);

NR = Not Rare (The frequency of sighting was between 34% to 15% out of the total no. of sampling visits);

R = Rare (The frequency of sighting was between 14% to 5% out of the total no. of sampling visits);

The family-wise distribution of butterfly species shows that among four different habitats the forest habitat harbors a maximum number of butterfly species. A total of 141 butterfly species have been recorded from the Forest habitat followed by 135 Species from the Riverine habitat, 111 species from the Human habitat, and 66 species from the Agricultural habitat (Figure 6).

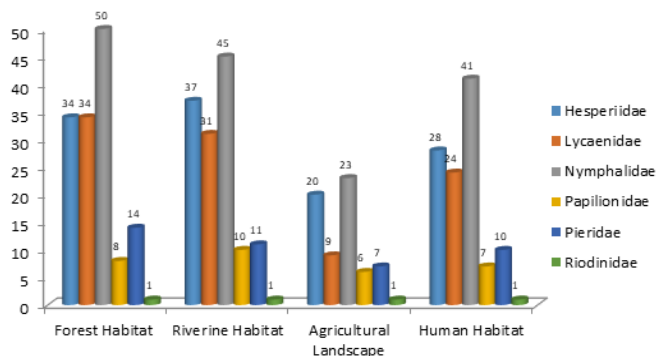


Figure 6. Family wise distribution of butterfly species from the four habitats (Forest, Riverine, Agricultural, and Human) in and around the Unakoti Archaeological Site.

Seasonal butterfly diversity depicts the occurrence of 142 species in Pre-monsoon, 150 species in monsoon, and 144 species in post-monsoon season (Figure 7). Among the recorded species names of a few like *Erionota apex*, *Allotinus unicolor*, *Logania distant*, *Nacaduba hermus*, *Petrelaea dana*, *Prosotas pia*, *Suasa lisides*, *Araotes lapithis*, *Rapala dieneces*, and *Mycalasis intermedia* are worth mentioning .

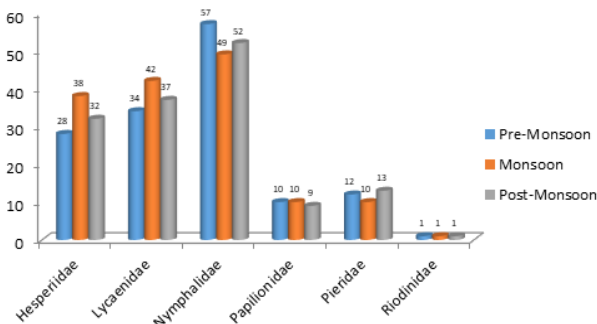


Figure 7. Seasonal butterfly diversity in and around the Unakoti Archaeological Site.

DISCUSSION

A majority of the previous studies regarding butterflies of Tripura were carried out within the confinements of protected areas of the state (Majumder *et al.* 2012); (Majumder *et al.* 2013); (Lodh and Agarwala, 2016); (Agarwala and Majumder, 2019). Consequently, vast areas with potential habitats throughout Tripura remains poorly studied to date. In this context, the present study was an attempt to throw light on one such potential region outside the designated protected areas. Documentation of a total number of 216 butterfly species, including 59 new records for the butterfly fauna of Tripura from such a small study area justifies the aforesaid statement. Among documented butterflies, a maximum number of species belongs to the Nymphalidae family, a common trend that can be observed in the northeastern region as well as most other parts of India (Bora and Meitei, 2014).

Besides the forest and riverine habitats, which are found to be the most species-rich, noticeable butterfly diversity was observed in the human in-habited portion of the study area too. A total of 111 butterfly species have been recorded throughout the study from such a habitat. In the main worship area of the Unakoti Archaeological Site (enlisted in the human habitat), a significant amount of worshipping materials such as fruits, sweets, flowers, etc. remain as leftovers and subsequently rot over time after completion of the puja rituals. Such rotten leftovers, along with small streams present in the human habitat attract many butterflies and serve as potential puddling ground within the habitat. Landscape heterogeneity favors butterfly diversity in the agricultural landscape (Weibull *et al.*, 2008). Most of the agricultural fields in our study area are situated among small patches of temporarily unused plots of previously cultivated areas covered with grasslands. In addition to these patches, forest covers and streams adjacent to the agricultural land further contributes to the heterogeneity of the landscape. Such a scenario provides a firm ground for the occurrence of 66 butterfly species found in the agricultural landscape of our study area.

Seasonal variation in butterfly diversity is a rather common phenomenon in various landscape scenarios. These can be caused by factors like the availability of host plants, nectar plants, puddling grounds, or in response to adverse conditions like a forest fire, etc. On the contrary, in our present study, season-wise butterfly diversity depicts the occurrence of 142 species in Pre-monsoon, 150 species in monsoon, and 144 species in post-monsoon. Such species richness throughout the year, particularly during pre-monsoon and post-monsoon may be attributed to the presence of ample small streams in the area. These small streams are nourished throughout the year by groundwater seeping out from the rocky hill slopes and attract a large number of butterflies from the hills and nearby areas where adverse conditions like artificial forest fires for the preparation of Jhum cultivation prevails during the dry season.

Butterfly species like *Erionota torus*, *Psoilos fuligo*, *Cephenes acalle*, *Oriens gola*, *Celaenorrhinus leucocera*, *Acytolepis puspa*, etc. available throughout our neighboring north-eastern states, remained unreported in Tripura till date. Hence, a high number of new records for the state from such a small study area can be further rationalized.

We have observed some forest streams along with suitable vegetation adjacent to our study area and

such areas may harbor potential butterfly diversity along with possibilities to revitalize the checklist of butterfly of Tripura further.

The abundance of host plants and nectar plants play a pivotal role in butterfly diversity in a particular area. Opportunities regarding the study on such plants in this study area have been well perceived. This could play a crucial role in butterfly diversity conservation within the area.

CONCLUSION

Illegal logging and other anthropogenic activities in such a biodiversity-rich area can lead to irreparable damage to the habitats. Little or nothing can be done through activities such as tree plantation to restore microhabitats within a short period. The diverse array of habitats possessed by the Unakoti Archaeological Site and its surrounding areas, result in remarkable butterfly diversity as butterflies require a variety of vegetations for the survival of different stages of their life. Although the site is frequently visited by local people, tourists and pilgrims, little has been done to create awareness among them. Such a rich natural habitat cannot be conserved in its pristine form without creating awareness among the masses particularly the younger generation. By implementing a thoughtfully planned carrying-capacity based tourism management, well trained young enthusiasts can earn their living as nature guides by unveiling the spectacular world of fluttering beauties to tourists and nature lovers. A vital step towards eco-tourism based nature conservation can be taken with such initiatives. It is the need of the hour to create mass awareness among locals as well as tourists and pilgrims to conserve the pristine habitats of the Unakoti Archaeological Site, one of the most unique fusions of picturesque natural beauty and phenomenal artistic excellence of ancient sculptors in the country.

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Photo plate 1. 1. *Badamia exclamationis*; 2. *Burara harisa harisa*; 3. *Hasora badra badra*; 4. *Hasora chromus chromus*; 5(a). *Aeromachus jhora*; 5(b). *Aeromachus jhora*; 6. *Aeromachus pygmaeus*; 7. *Ancistroides nigrita diocles*; 8. *Astictopterus jama olivascens*; 9. *Cupitha purreea*; 10. *Erionota apex*; 11. *Erionota torus*; 12(a). *Halpe aucma*; 12(b). *Halpe aucma*; 13(a). *Halpe cf. filda*; 13(b). *Halpe cf. filda*; 14. *Halpe porus*; 15(a). *Halpe wantona*; 15(b). *Halpe wantona*; 16. *Halpe zema zema*

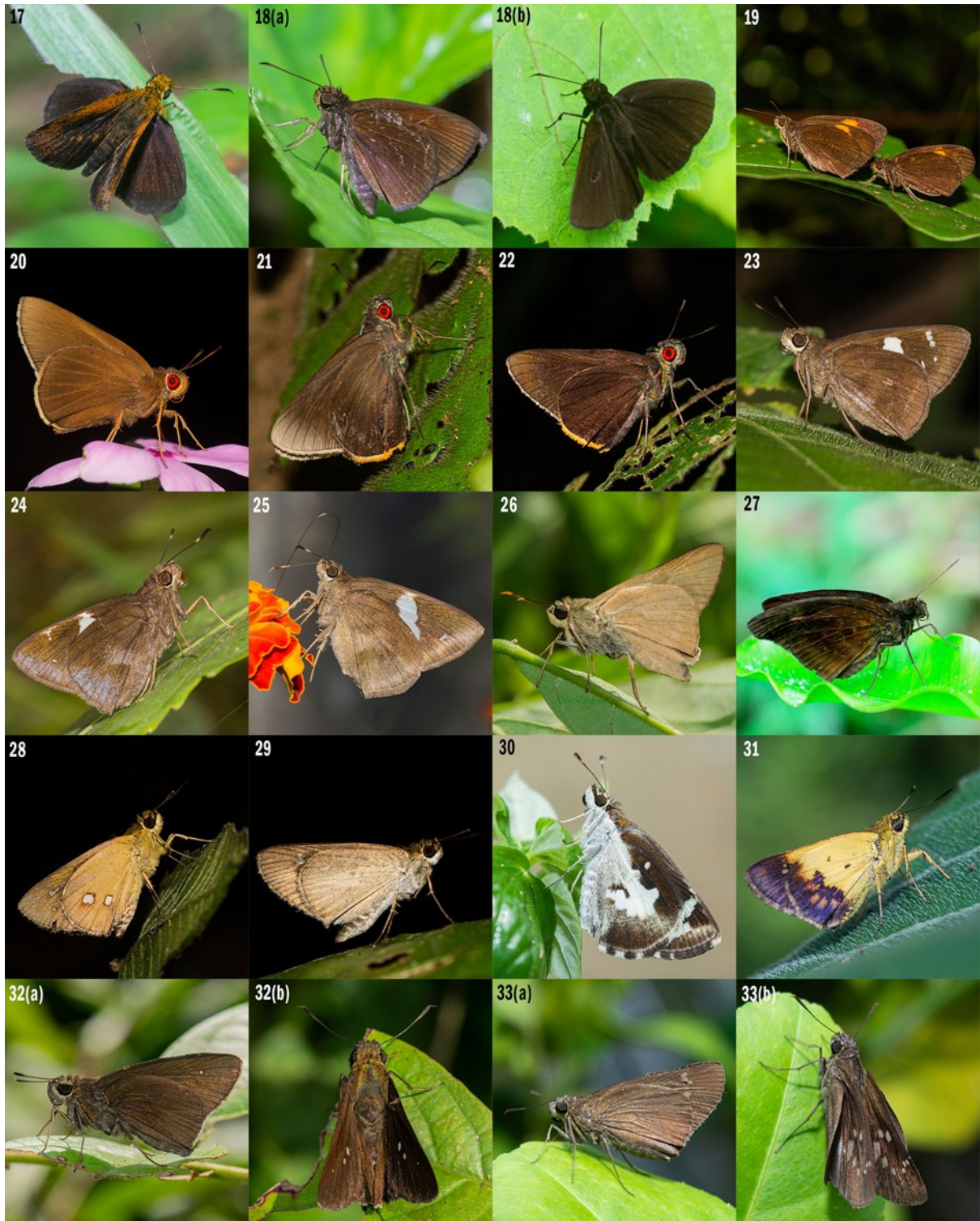


Photo plate 2. 17. *Iambrix salsala salsala*; 18(a). *Koruthaialos butleri*; 18(b). *Koruthaialos butleri*; 19. *Koruthaialos sindu monda*; 20. *Matapa aria*; 21. *Matapa cresta*; 22. *Matapa sasivarna*; 23. *Notocrypta curvifascia curvifascia*; 24. *Notocrypta feisthamelii alysos*; 25. *Notocrypta paralysos asawa*; 26. *Pithauria stramineipennis*; 27. *Psolos fuligo subfasciatus*; 28. *Scobura isota*; 29. *Suada swerga swerga*; 30. *Udaspes folus*; 31. *Zographetus satwa*; 32(a). *Baoris chapmani*; 32(b). *Baoris chapmani*; 33(a). *Baoris farri*; 33(b). *Baoris farri*

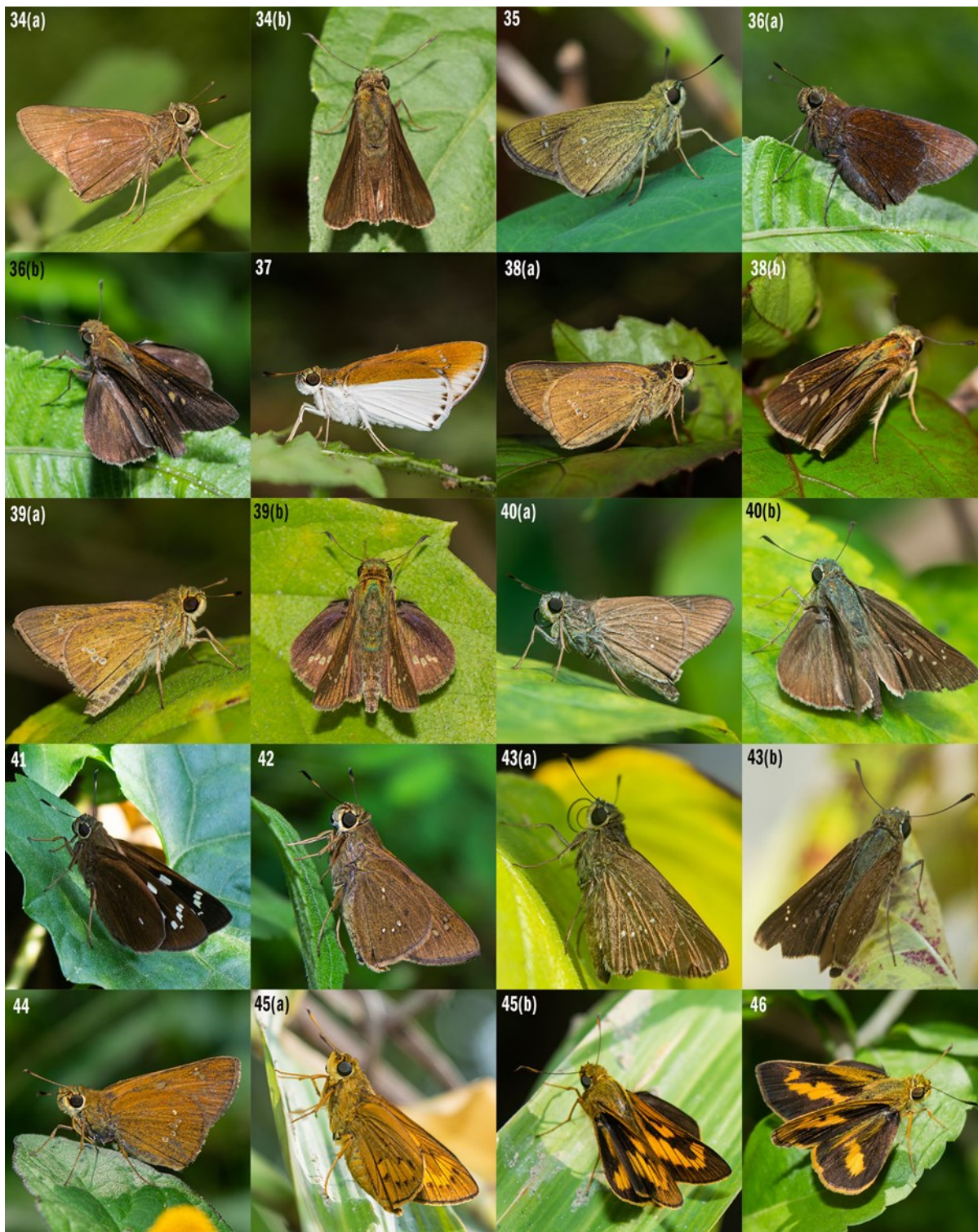


Photo plate 3. 34(a). *Baoris unicolor*; 34(b). *Baoris unicolor*; 35. *Borbo cinnara*; 36(a). *Caltoris cahira austeni*; 36(b). *Caltoris cahira austeni*; 37. *Iton semamora semamora*; 38(a). *Parnara bada*; 38(b). *Parnara bada*; 39(a). *Parnara ganga*; 39(b). *Parnara ganga*; 40(a). *Pelopidas agna agna*; 40(b). *Pelopidas agna agna*; 41. *Pelopidas assamensis*; 42. *Pelopidas conjuncta conjuncta*; 43(a). *Pelopidas mathias mathias*; 43(b). *Pelopidas mathias mathias*; 44. *Polytremis lubricans lubricans*; 45(a). *Cephrenes acalle oceanica*; 45(b). *Cephrenes acalle oceanica*; 46. *Oriens gola pseudolus*

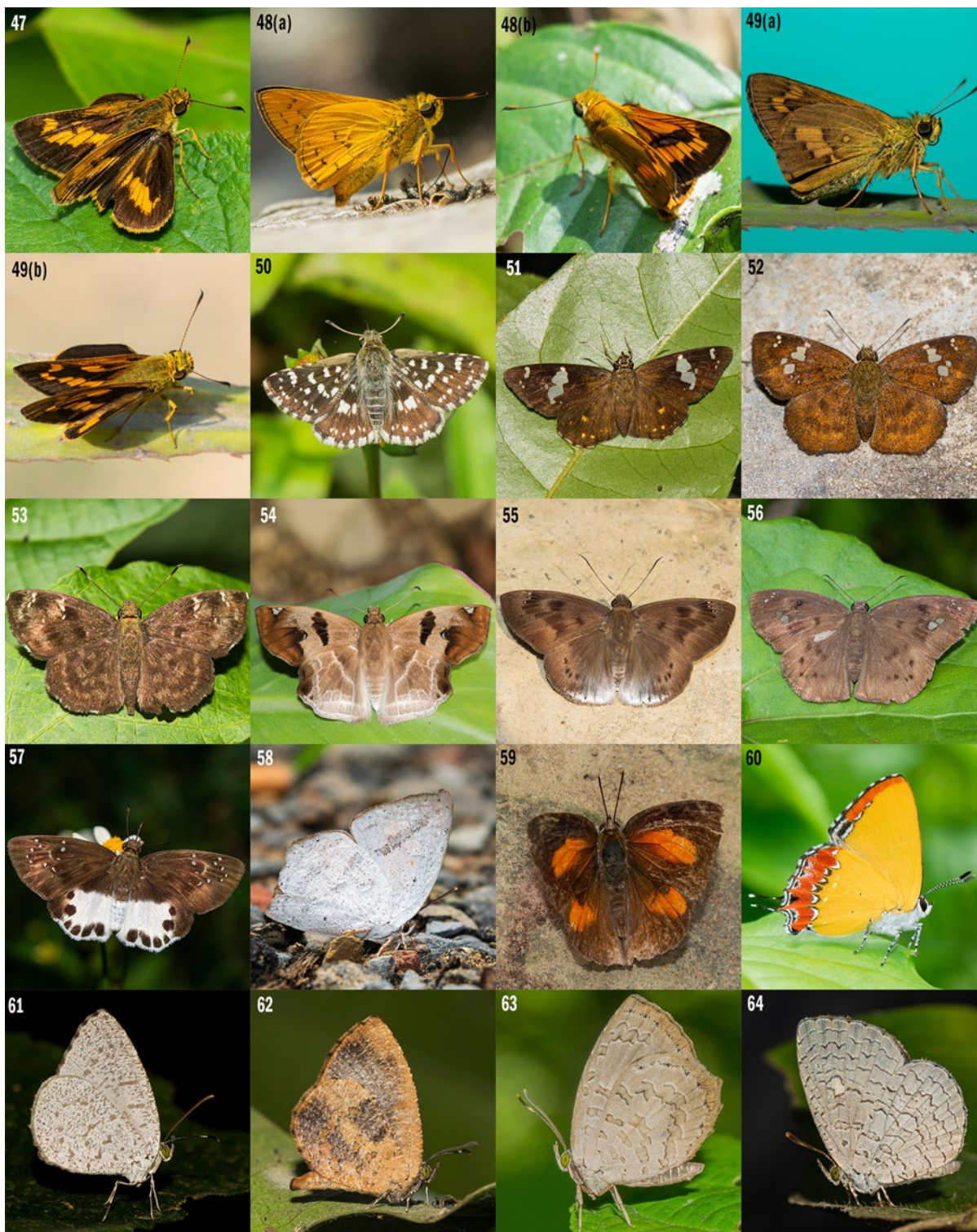


Photo plate 4. 47. *Oriens goloides*; 48(a). *Telicota bambusae*; 48(b). *Telicota bambusae*; 49(a). *Telicota ohara jix*; 49(b). *Telicota ohara jix*; 50. *Spialia galba galba*; 51. *Celaenorrhinus leucocera*; 52. *Pseudocoladenia dan fabia*; 53. *Sarangesa dasahara dasahara*; 54. *Odonoptilum angulata angulata*; 55. *Tagiades gana athos*; 56. *Tagiades japetus ravi*; 57. *Tagiades litigiosa litigiosa*; 58. *Curetis acuta dentate*; 59. *Curetis bulis bulis*; 60. *Heliophorus epicles latilimbata*; 61. *Allotinus unicolor continentalis*; 62. *Logania distant massalia*; 63. *Miletus chinensis assamensis*; 64. *Spalgis epius epius*



Photo plate 5. 65. *Anthene emolus emolus*; 66. *Anthene lycaenina lycambes*; 67. *Acytolepis puspa gisca*; 68. *Castalius rosimon rosimon*; 69. *Catochrysops strabo strabo*; 70. *Celastrina lavendularis limbata*; 71. *Chilades lajus lajus*; 72. *Ionolyce helicon merguiana*; 73(a). *Jamides alecto alocina*; 73(b). *Jamides alecto alocina*; 74. *Jamides bochus bochus*; 75(a). *Jamides celeno celeno*; 75(b). *Jamides celeno celeno*; 76(a). *Jamides pura pura*; 76(b). *Jamides pura pura*; 77. *Lampides boeticus*; 78. *Leptotes plinius plinius*; 79. *Megisba malaya sikkima*; 80.



Photo plate 6. 82. *Neopithecops zalmora zalmora*; 83. *Petrelaea dana*; 84. *Prosotas bhutea*; 85. *Prosotas dubiosa indica*; 86. *Prosotas lutea sivoka*; 87. *Prosotas nora nora*; 88. *Prosotas pia marginata*; 89. *Pseudozizeeria maha maha*; 90. *Zizeeria karsandra*; 91. *Zizina otis sangra*; 92. *Poritia hewitsoni hewitsoni*; 93. *Iraota timoleon timoleon*; 94. *Spindasis lohita himalayanus*; 95. *Spindasis syama peguanus*; 96. *Arhopala centaurus pirithous*; 97. *Flos adriana*; 98. *Surendra quercetorum quercetorum*; 99. *Zinaspa todara distorta*; 100. *Catapaecilma major anais*; 101. *Cheritra freja evansi*



Photo plate 7. 102. *Suasa lisides lisides*; 103. *Araotes lapithis lapithis*; 104(a). *Rapala dieneces dieneces*; 104(b). *Rapala dieneces dieneces*; 105. *Rapala manea schistacea*; 106(a). *Rapala pheretima petosiris*; 106(b). *Rapala pheretima petosiris*; 107(a). *Rapala suffusa suffuse*; 107(b). *Rapala suffusa suffuse*; 108. *Rapala varuna orseis*; 109. *Hypolycaena erylus himavantus*; 110. *Hypolycaena othona othona*; 111. *Zeltus amasa amasa*; 112. *Charana mandarina mandarina*; 113. *Loxura atymnus continentalis*; 114. *Remelana jangala ravata*; 115. *Euripus nyctelius nyctelius*; 116. *Rohana parisatis parisatis*; 117. *Ariadne merione tapestrina*; 118. *Charaxes arja*

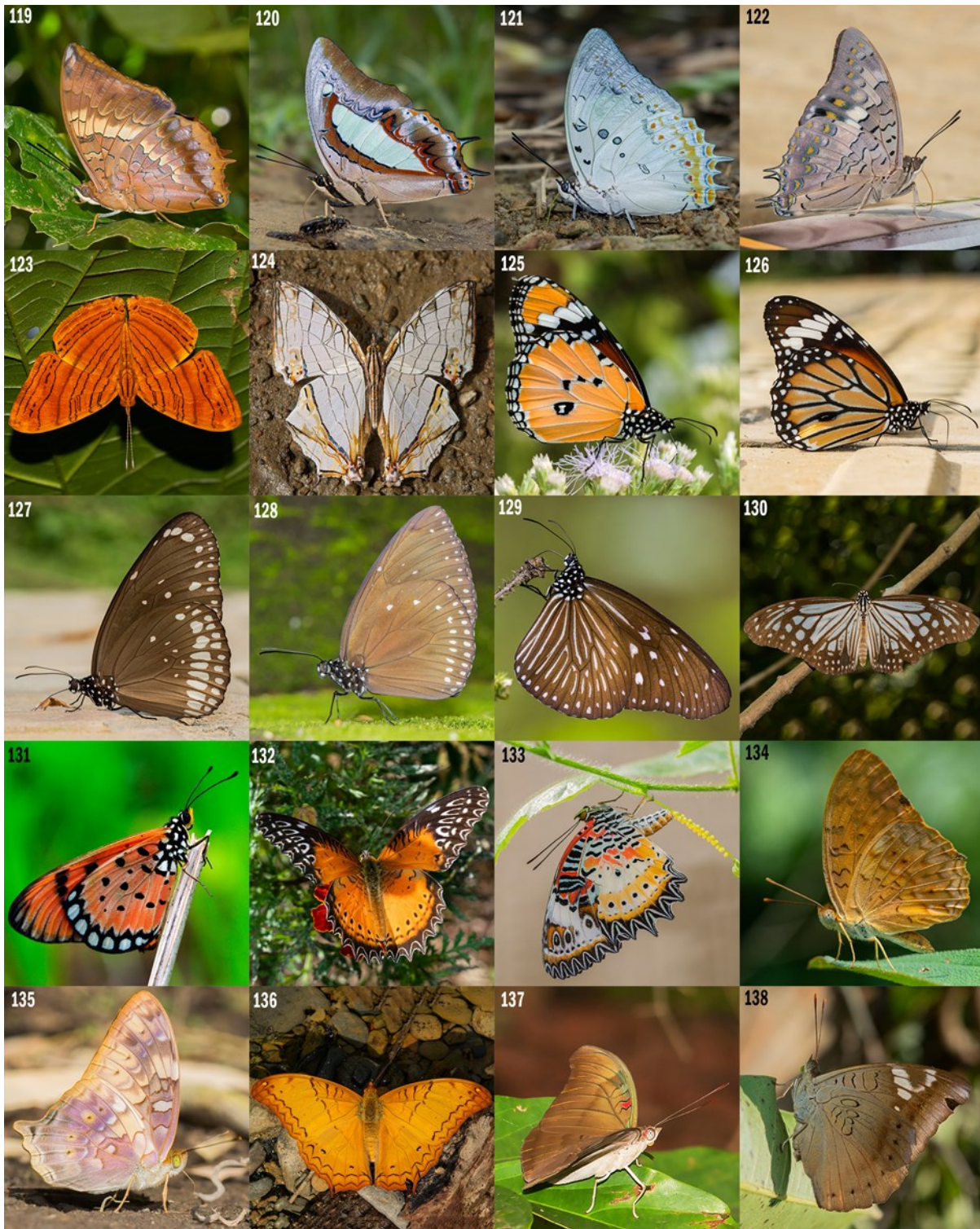


Photo plate 8. 119. *Charaxes bernardus hierax*; 120. *Charaxes bhārata*; 121. *Charaxes delphis delphis*; 122. *Charaxes solon sulphurous*; 123. *Chersonesia intermedia rahrioides*; 124. *Cyrestis thyodamas thyodamas*; 125. *Danaus chrysippus chrysippus*; 126. *Danaus genutia genutia*; 127. *Euploea core core*; 128. *Euploea klugii klugii*; 129. *Euploea mulciber mulciber*; 130. *Parantica aglea melanoides*; 131. *Acraea terpsicore*; 132. *Cethosia biblis tisamena*; 133. *Cethosia cyane cyane*; 134. *Phalanta phalantha phalantha*; 135. *Vagrans egista sinha*; 136. *Vindula erota erota*; 137. *Dophla evelina derma*; 138. *Euthalia aconthea garuda*

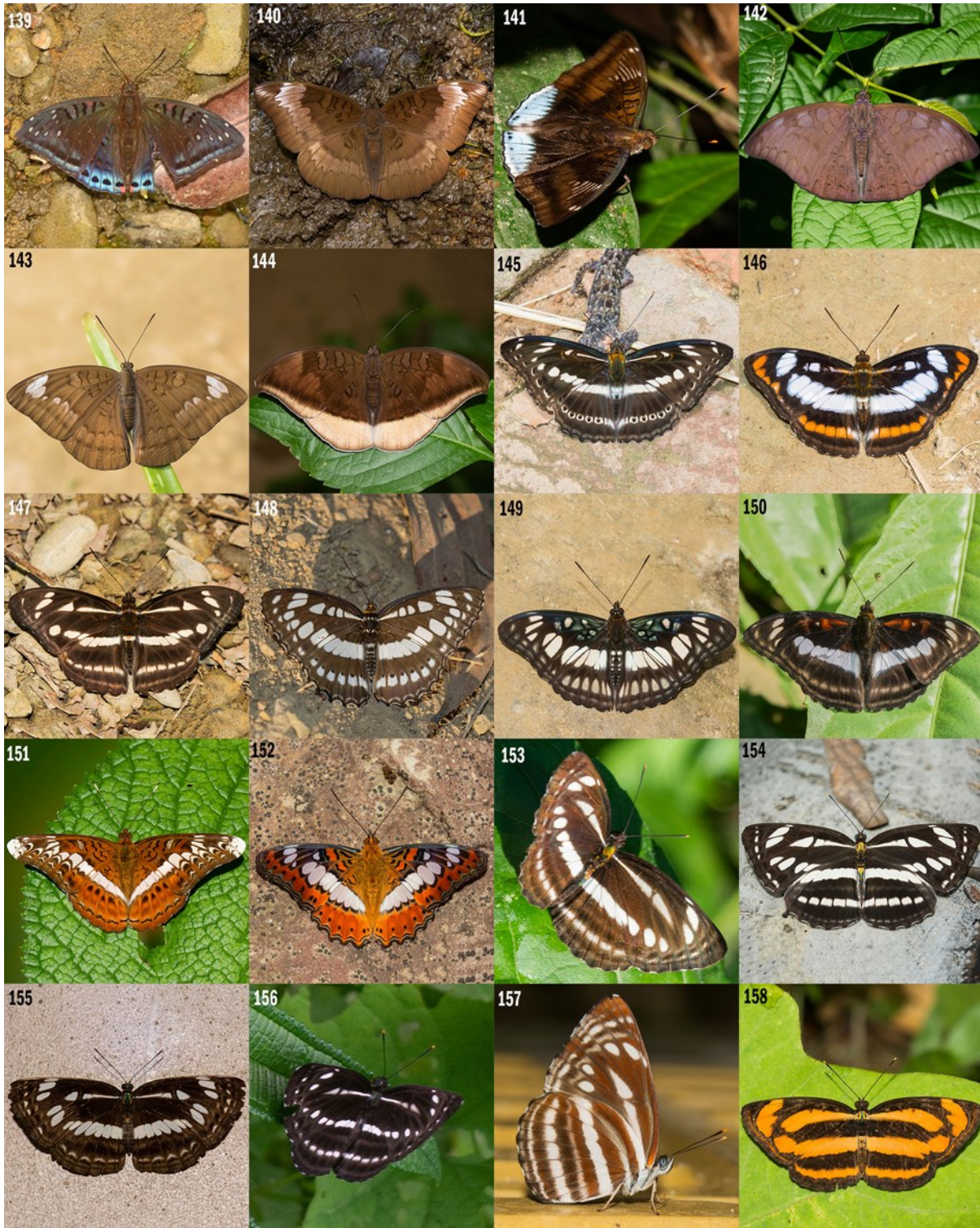


Photo plate 9. 139. *Euthalia lubentina lubentina*; 140. *Euthalia monina kesava*; 141. *Euthalia phemius phemius*; 142. *Tanaecia jahnu jahnu*; 143. *Tanaecia julii appiades*; 144. *Tanaecia lepidea lepidea*; 145. *Athyma asura asura*; 146. *Athyma nefte inara*; 147. *Athyma kanwa phorkys*; 148. *Athyma perius perius*; 149. *Athyma ranga ranga*; 150. *Athyma selenophora bahula*; 151. *Lebadea martha martha*; 152. *Moduza procris procris*; 153. *Neptis clinia susruta*; 154. *Neptis hylas kamarupa*; 155. *Neptis jumbah jumbah*; 156. *Neptis magadha khasiana*; 157. *Neptis nata adipala*; 158. *Pantoporia hordonia hordonia*



Photo plate 10. 159(a). *Pantoporia sandaka davidsoni*; 159(b). *Pantoporia sandaka davidsoni*; 160. *Phaedyma columella ophiana*; 161. *Parthenos sylvia gambrisius*; 162. *Hypolimnias bolina jacintha*; 163. *Junonia almana almanac*; 164. *Junonia atlites atlites*; 165. *Junonia hierta hierta*; 166. *Junonia iphita iphita*; 167. *Junonia lemonias lemonias*; 168. *Kallima inachus inachus*; 169. *Kaniska canace canace*; 170. *Symbrenthia hypselis cotanda*; 171. *Symbrenthia lilaea khasiana*; 172. *Pseudergolis wedah wedah*; 173. *Stibochiona nicea nicea*; 174. *Discophora sondaica zal*. 175. *Elymnias hypermnestra undularis*; 176. *Elymnias malelas malelas*; 177. *Elymnias nesaea timandra*



Photo plate 11. 178. *Melanitis leda leda*; 179. *Melanitis zitenius zitenius*; 180. *Lethe chandica chandica*; 181. *Lethe europa niladana*; 182. *Lethe mekara zuchara*; 183. *Lethe vindhya vindhya*; 184. *Mycalesis gotama charaka*; 185. *Mycalesis intermedia*; 186. *Mycalesis mineus mineus*; 187. *Mycalesis visala visala*; 188. *Orsotriaena medus medus*; 189. *Ypthima baldus baldus*; 190. *Ypthima huebneri*; 191. *Graphium agamemnon Agamemnon*; 192. *Papilio bianor gladiator*; 193. *Papilio clytia clytia*; 194. *Papilio demoleus demoleus*; 195. *Papilio helenus helenus*; 196. *Papilio memnon agenor*

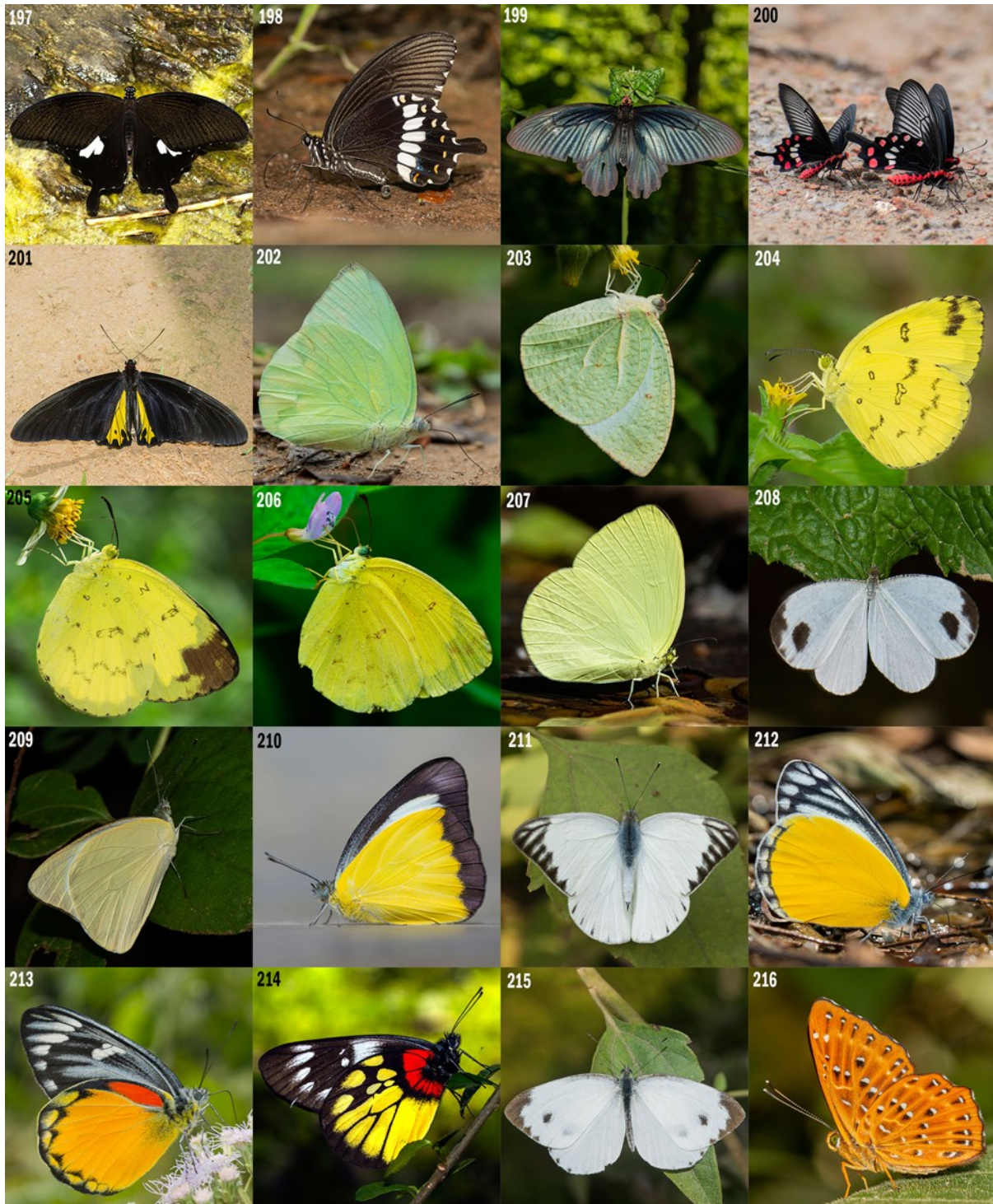


Photo plate 12. 197. *Papilio nephelus chaon*; 198. *Papilio polytes romulus*; 199. *Atrophaneura varuna astorion*; 200. *Pachliopta aristolochiae aristolochiae*; 201. *Troides helena cerberus*; 202. *Catopsilia pomona pomona*; 203. *Catopsilia pyranthe pyranthe*; 204. *Eurema andersonii jordani*; 205. *Eurema blanda silhetana*; 206. *Eurema hecabe hecabe*; 207. *Gandaca harina assamica*; 208. *Leptosia nina nina*; 209. *Appias albina darada*; 210. *Appias lycida eleonora*; 211. *Appias olferna*; 212. *Delias agostina agostina*; 213. *Delias descombesi descombesi*; 214. *Delias pasithoe pasithoe*; 215. *Pieris canidia indica*; 216. *Zemeros flegyas indicus*

