Fauna of Protected Areas - 25:
BUTTERFLIES OF KALAKAD-MUNDANTHURAI TIGER RESERVE, TAMIL NADU

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ABSTRACT

A survey of Kalakad-Mundanthurai Tiger Reserve (K-MTR), Western Ghats, southern India, from September 2002 to March 2003 revealed the presence of 24 species of butterflies. Observation on diagnostic morphological features, habitat range, larval and adult food, months of abundance, duration of flight, mode of flight and associated habits, mimicry and conservation status are included with meteorological data.

KEYWORDS

biodiversity, butterfly, conservation status, ecology, flight, food, K-MTR, mimicry, morphology.

India harbours about 1501 species of butterflies, 285 species are found in southern India (Thomas, 1966), of which 45 species are endemic to southern India. The Kalakad-Mundanthurai Tiger Reserve (K-MTR) in the Western Ghats is noted for its rich species diversity and a study of butterfly diversity was conducted from September 2002 to March 2003. The data generated on the butterfly fauna of this reserve with details of ecology are presented in this paper.

MATERIALS AND METHODS

Habitat

The 895km^2 K-MTR (Image 1[w]) was the 17th tiger reserve established in India. It is located (8^{0}25'-8^{0}53'N & 77^{0}10'-77^{0}35' E) at the southern end of Western Ghats extending into Tirunelveli and Kanyakumari districts in the biogeographical provinces 4.14.4 (Deccan and thorn forests) and 4.1.1 (Malabar forests). There are two wildlife sanctuaries *viz*., Kalakad Wildlife Sanctuary and the Mundanthurai Wildlife Sanctuary.

The K-MTR has an undulating topography with forests extending from 40 to 1800m. It has three major peaks viz., Agasthiyarmalai (1867m), Anithilaipothigai (1826m) and Nagapothigai (1669m). Geologically, K-MTR is of metamorphic origin and archaean in age.

The K-MTR experiences warm tropical climate with temperature ranging between a maximum of 23-29^{0}C and a minimum of 17-25^{0}C. The south-west monsoon from June to August with an average annual rainfall varying from 750mm in the northern end and eastern outer slopes and more than 3500mm in the western high ranges. The north-west monsoon is from October to December.

The K-MTR has about 2000 species of plants under 10 major forest types: southern tropical wet evergreen, semievergreen, southern moist mixed deciduous, tropical riparian fringe, dry teak, carnatic umbrella thorn, southern mixed dry deciduous, southern *Euphorbia* scrub, *Ochlandra* reeds and grasslands of low and high altitudes. Immediately after the onset of monsoons, the host plants of butterflies appear with leaf blush and flowers.

Survey, collection and identification

Initially, a preliminary survey was conducted to identify spots with reasonably viable population of butterflies. Such areas were visited fortnightly from September 2002 to March 2003. Data on morphological features, habitat range, larval and adult food, mode of flight and associated habits, month-wise abundance, hour-wise abundance from 07.00 to 17.00hr, i.e., duration of flight and mimicry were recorded along with cloud cover, nature of wind, rainfall and temperature. To ensure correct identity, specimens were collected with sweeping nets, baits of decaying fruits, honey, salt, moist earth etc., and released after identification. The specimens required for further identification in the laboratory were killed and preserved by standard procedures. The butterflies were identified based on our personal observations and literature (Thomas, 1966; Lewis, 1973; Stanek, 1977; Mani, 1986; Matthew, 1987; Ford, 1990; Mathew, 1990; Smart, 1991; Haribal, 1992; Mathew & Rahamathulla, 1993; Mathew *et al.*, 1998; Daccordi *et al.*, 1988; Vane-Wright & Ackery, 1988; Whalley, 1988; Allaby, 1989; Haribal, 1992; Carter, 1992; Gay *et al.*, 1992; Feltwell, 1998; Gunathilagaraj, 1998) with a note on their conservation status.

RESULTS AND DISCUSSION

Though butterflies belonging to nine families were observed in the K-MTR, only the members of four families Acraeidae, Danaidae, Libytheidae and Papilionidae were studied in detail and hence the information pertaining to them are presented in this paper (Tables 1 and 2 and Images 3[w] and 4[w]).

Acraeidae

The small to medium-sized acraeids with narrow and very sparsely scaled wings and long and slender abdomen are yellowish or tawny with few dark markings. Their forewings are long and hind wings are rounded. Though they resemble danaids in appearance and habits, the males do not exhibit secondary sexual characteristics. They fly straight and forward, closer to the ground, often fearlessly and slowly as danaids with wings positioned horizontally, a characteristic flight called 'sailing'. They were found settling frequently on flowers and exposed terrain in K-MTR. They were found ejecting foul smelling, oily, yellow defensive secretion from the thorax to deter avian and reptilian predators.

[w] see Images 1-4 on the web at www.zoosprint.org

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Danaidae

The danaids are the second dominant group of butterflies followed by papilionids. They are hardy and leathery butterflies with very weak legs that are unfit for walking. The males possess secondary sexual characteristics. Their unpleasant smell and unpalatable body fluids enable them to gain protection from their natural enemies such as birds and lizards. Hence, they characteristically exhibit a fearless and exhibit slow flight. They were found congregating on shrubs or bushes in large numbers and frequenting flowers and damp places. Their abundance could be attributed to the abundance of their food plants in the plains and foothills of K-MTR.

Libytheidae

The libytheids or beaks (their labial palps are modified into a long snout-like process in front of the head) are represented by only two species of genus *Libythca* in K-MTR. They are dark brown in colour with narrow forewings. At rest, they draw the forewings closer to their body and cover by hind wings, exposing only the tip of forewings. They mimick dry leaves when resting on twigs. The evergreen forest endemic libytheids were commonly found around streams and damp places of K-MTR.

Papilionidae

The largest and magnificient papilios or swallowtails constitute the most diversified family with 14 species in K-MTR. Generally, they have long and narrow wings with pointed forewings. Many of them have tails in the hind wings, hence the common name. Their predominant background colour is black with varied colour markings and patterns. Their principal food plants belong to the families Aristolochiae, Anonaceae and Rutaceae. The larvae of papilios are protected by their unpleasant taste or smell. This defensive character is also present in the adults of birdwings and red-bodied swallowtails. The caterpillars derive toxic plant materials from their host plants belonging to Aristolochiae, sequester and store them in their tissues. These poisonous materials are carried over to adults and thus they gain protection from predators. Though they exhibit varied pattern of flight they are capable of rapid flying when threatened. The mimes mimick the danaids. The birdwings and red-bodied swallowtails display bright red and yellow as warning colours. Sexual dimorphism is not well pronounced among the members of this family.

The abundance and diversity of butterflies of K-MTR could be attributed to the evergreen forests of K-MTR at low altitude that receives fairly good rainfall and experiences only a brief period of dryness. The diversity and abundance of butterflies were found poor where human activities such as habitat fragmentation and destruction, grazing, monoculture, forest fire etc., have been taking place. Hence, prevention of habitat fragmentation and destruction, regulation of grazing, avoidance of monoculture and prevention of forest fire etc., in the K-MTR and general awareness programme to people especially to those who visit temples *viz*., Sorimuthyanar Kovil and Nambikovil inside the K-MTR forest will conserve and augment the butterfly fauna of K-MTR. Further studies on the biodiversity of butterflies with special reference to their host plants and factors that affect their distribution, diversity and abundance will be a rewarding experience.

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Table 1. Diagnostic morphological features, habitat and range and mode of flight and associated habits of butterflies of Kalakad-Mundanthurai Tiger Reserve.

Butterfly	Diagnostic morphological features	Habitat range	Larval and adult food
Acraeidae			
1. *Acraea violae* Fabricius [=*Telchinia violae* (Fabricius)] (Tawny Coster)	male dorsally tawny orange or brick red, male ventrally glassy red, forewings with a black marginal border having a row of yellow spots, hind wings with a cluster of 5 black ringed white spots at the base, the marginal band with larger yellowish white spots and an inner border, females yellowish red, i.e., paler than male, forewings with broad markings and marginal bands, hind wing with large spots in the marginal band, wing span 50 - 65mm.	plains and hilly regions, low altitudes, throughout India, the only South Indian representative of this family.	L: Cucurbitaceae, Passifloraceae etc. A: *Tridax* sp. (Asteraceae) *Lantana* spp. *Chinese chaste tree Vitex negundo*, tall chaste tree *V. altissima* and monk's pepper tree *V.agnus-castus* (Verbenaceae), land-caltrops *Tribulus terrestris* (Zygophyllaceae) etc.
Danaidae			
2. *Parantica aglea aglea* Cramer [=*Danais aglea* (Cramer)] (Glassy Blue Tiger)	transparent brown wings with bluish white streaks and spots, forewing cell streak divided lengthwise into 3 portions and an elongated streak below the cell, hind wings with broad discoidal streaks and spots, ventrally dark brown with more clearly defined markings, males have 2 patches of black scent scales, wing span 70-85 mm,the apex and termen are narrowly edged with black, veins black, ventral side paler.	found in wet and moist places of hilly regions with heavy rainfall up to 2000 m of South India and Himalayas.	L: Asclepiadaceae, Apocynaceae etc. A: *Lantana* spp.*Crotalaria* spp. (Fabaceae) etc.
3. *Danaus chrysippus chrysippus* (Linnaeus) (= *Danais chrysippus* Linnaeus) (Plain Tiger, African Monarch, African Queen, Lesser Wanderer, AK Butterfly)	dorsally reddish brown (tawny) with black borders in both fore- and hind wings and black apices in forewings, forewings with variable numbers of white spots in the costa and apex, forewings upper half dark brown with white spots in the black area and hind wings with 6 black spots, hind wings with 4 small black spots around the cell in male and 3 in female with a pouch in female, ventrally dull orange, wingspan 70 - 80mm.	everywhere including deserts throughout India, up to 3000m commonest of Indian butterflies.	L: Asclepiadaceae especially madar, *Calotropis gigantea* rajmahal hemp *Marsdenia tenacissima*, common wax plant *Hoya carnosa* and emetic swallowwort *Tylophora indica* (Asclepiadaceae) *Dragea volubilis* etc. A: 1. *Asclepias* sp. (Asclepiadaceae). 2. fiddle-leaved jatropha *Jatropha panduraeflia* (Euphorbiaceae). 3. *Lantana* spp. Cyelon carissa, *Carissa spinarum* (Apocynaceae) etc.
4. *Tirumala limniace exoticus* Gmelin [= *Danais limniace leopardus* (Butler)] (Blue Tiger)	large, dorsally black with irregular white or pale blue markings and marginal spots, forewings with black basal area, ventrally golden brown and black basal areas of fore-wings with pendulous pouches, sex marks in males and stroked by abdominal brushes producing scent aphrodisiac to females, wing span 90-100 mm.	forests hills and plains except deserts, throughout India, Sri Lanka, Pakistan, China, Bangladesh, Mynmar,Thailand, commonest butterfly.	L: AsclepiadaceaeApocynaceae etc. A: pink cock's comb, *Celosia polygonoides* (Fabaceae), lucerne *Medicago sativa*, sunnhemp *Crotalaria juncea*, aztec marigold, *Tagetes erecta* (Asteraceae), heliotrope *Heliotropium arborescens* (Boraginaceae), *Lantana* spp. etc.
5. *Tirumala septentrionis dravidarum* Fruhstor [= *Danais melissa* (Cramer)] (Dark Blue Tiger)	dorsally black with pale blue markings, similar to blue tiger (*T. limniace exoticus*) but with darker and narrower markings, hind wings with a characteristic wish-bone marking in the cell formed by two white streaks joined at the base, ventrally darker than *T. limniace exoticus* but without the golden brown tinge, wingspan 80-105 mm.	a common butterfly of plains and hilly regions at altitudes up to 2700 m throughout India, also found in Sri Lanka, Pakistan, Afghanistan, Bhutan, Bangladesh, Mynmar, Malaysia, Thailand, Indonesia, China, Taiwan, Australia, New Guinea, Pacific islands.	L: Asclepiadaceae: e.g. *Dregea volubilisVallaris glabra* and *V. solanacea* (Apocynaceae) etc. A: Fabaceae
6. *Danais nilgiriensis* (Nilgiri Tiger)	dorsally dull brownish with bluish white spots, ventrally dark brownish with sharp spots, wing span 90mm.	endemic to hilly regions at low altitudes of southern Western Ghats and Nilgiri, rarely seen in plains	L: AsclepiadaceaeApocynaceae A: wild and garden flowers
7. *Danaus genutia genutia* (Cramer) [= *Danais plexippus* (Linnaeus)] (Common Tiger/ Striped Tiger/Monarch Butterfly)	dorsally orange brown (tawny) with very bold black veins and apical white and black marginal bands, ventrally pale with more prominent black lines along the veins, wingspan 75 to 95mm.	forest edges and scrub jungles and up to 2700m in hills, open plains with moderate to good rainfall, entire Oriental region, the America, Australia, Canary islands, Mediterranean countries.	L. Apocynaceae, *Ceropegia* spp. feeds on poisonous milkweeds especially blood flower, *Asclepias curassavica,* Madagascar jasmine, *Stephanotis floribunda*, swallowwort *Calotropis procere*, *Calotropis* spp., *Marsdenia tinctoria, Ra phistemma pulchellum, R. lemma, Tylophora camosa,* rosy milkweed *Oxystelm (=exculentum) secamone* and (Asclepiadaceae) etc. and stores the poisons in tissue as defense A: fiddle-leaved jatropha, *Lantana* spp.Indian

Butterfly	Diagnostic morphological features	Habitat range	Larval and adult food
			chestnut *Castanopsis indica* (Fagaceae), soapnut tree *Sapindus emarginatus* (Sapindaceae), radish *Raphanus sativus* (Brassicaceae), feather cock's comb, *Celosia argenta* (Amaranthaceae), Chinese sumac *Rhus chinensis* (Anacardiacae), cadillo *Urena lobata* (Malvaceae) etc.
8. *Euploea core core* (Cramer) (Common Indian Crow)	dorsally glassy brown with white marginal and terminal spots, either equal or decrease in size, forewings much darker than hind wings with short band, marginal spots of hind wings more prominent, ventrally light brown with spots as in the dorsal side and the band in forewing very conspicuous, male has sex pouches on the forewings, one of the commonest butterflies with number of subspecies, races and forms differ in pattern of spots, wing span 80 - 95mm.	forest, open and plains, throughout India, Pakistan, Sri Lanka, Bangladesh, Myanmar, Indonesia, Thailand, China and Australia.	L: banyan, *Ficus bengalensis*, cluster fig *Ficus glomerata*, peepal *Ficus religiosa*, *Ficus* spp.,black creeper *Ichnocarpus frutescens*, Easter tree *Holarrhena antidysenterica*, Indian sarsaparilla *Hemidesmus indicus*, *Cryptolepis elegans, C. longiflora, C. pauciflora, Crytolepis* spp., *Streblus asper* (Moraceae).oleander *Nerium oleander* (Apocynaceae) etc. A: fiddle leaved jatropha, scarlet-bush *Hamelia patens* (Rubiaceae), *Lantana* spp., aztec, marigold, common zinnia *Zinnia angustifolia* (Asteraceae), pink cock's comb, ber, land calotrops *Euphorbia geniculata* (Euphorbiaceae) etc.
9. *Idea malabarica* Moore [= *Hestialyncens* (Moore & de Niceville)] (Malabar Tree Nymph / Floater / Silver Paper Fly / Spectre)	one of the largest butterflies, dorsally greyish white and semi transparent, forewings with black margined veins, 2 large subbasal spots, a large oval discal part and 3 rows of spots on the outer half, costa black at the base and the remaining part alternately black and white, hind wings with similar black markings, cells with 2 streaks, thicker than forewings and costa white, ventrally similar to dorsal, wingspan 120 - 160mm.	damp thick jungle with heavy rainfall, Western Ghats, up to 1300m in the Nilgiris and up to the south of Maharastra, endemic to South India.	L: *Aganosma cymosum* (Apocynaceae) A: *Lantana* spp.
Libytheidae			
10. *Libythea lepita* Moore (Common Beak)	dorsally dark brown with broad central tawny bands in hind wings and yellowish or tawny bands or streaks from the base of the cells in forewings, the palpi elongate and form a beak or snout and hence the common name, wing span 50mm.	only in forests around streams and in wet patches, South India.	--
Papilionidae			
11. *Chilasa clytia* (Linnaeus) (Common Mime)	dorsally velvetty dark brown, forewings with a series of creamy white marginal and terminal spots in the discal series of long arrow shaped streaks, marginal crescents, narrow, yellow or white terminal spots between the veins and a black centered yellow tornal, spot, ventrally pale to rich dark brown, forewing markings as dorsally, hind wings with a series of large yellow terminal spots, wingspan 90-100mm.	low altitudes of hilly regions but occasionally up to 2500m in Himalayas 2700m in Sri Lanka and 1000m in South India and damp patches, found throughout Oriental region abundant during monsoon months.	L: *Alseodaphne semicarpifolia,*cinnamon *Cinnamomum zeylanicum, Litsea deccanensis, L. sebifera* and other member of Lauraceae A: flowers
12. *Graphium agamemnon menides* Felder and Felder [= *Zetiges agamemnon* (Linnaeus)] (Tailed Jay)	dorsally brownish black with variable number of bright green (yellow) spots and stripes, males greenish with stumply tail and females yellowish with longer tail, female has a scent wool in the dorsal fold, ventrally pale brown with black and red spots in the hind wings, wing margin with crescent shaped sopts, sexually dimorphic, wing span 85-100mm.	forest wooded areas with good rainfall from South India up to South Gujarat, Kumaon and further eastwards; also found in Sri Lanka, Pakistan, Myanmar, Bangladesh, Malaysia, China, Australia, Soloman islands, also common in plains because the larvae feed on mast tree *Polyalthia longifolia* grown in gardens	L: *Annona discolor,* sour sop *Annona musicata*, mast tree *Polyalthia longifolia*, custard apple, champac (Magnoliaceae), *Saccopetalum tomentosum, S. gaultheria* (Anonaceae), cinnamon etc. A: *Lantana* spp.
13. *Graphium doson* C & R Felder (Common Jay)	tailless, dorsally black with variable number of blue spots, both wings have marginal small bluish green spots, wing span 75 mm.	forest clearings and edges with good rainfall, throughout India.	L: *Polyalthia* spp. A: flowers
14. *Graphium sarpedon tereden* Felder & Felder [= *Zetides sarpedon* (Linnaeus)] (Common Blue Bottle Triangle)	dorsally black, forewings elongate, triangular with brilliant torquoise blue / greenish wide bands that pointed at the tip and a few rounded spots extending to the apex, hind wings with the bands pointed towards the tail and submarginal semilunar blue spots at the base and disc with red spots, ventrally brown with more bluish (than dorsal) bands, wingspan	common in forest wooded regions and open plains of South India, Himalayas; Kashmir and further east-	L: *Polyalthia* spp., *Miliusa odonatissima* (Annonaceae),cinnamon, camphor *Cinnamomum camphora*, machilus, avocado *Persea americana*, *Litsea glutinosa, A. semicarpifolia, Cryptocarya*

Butterfly	Diagnostic morphological features	Habitat range	Larval and adult food
	80-90mm.	wards, also found in Sri Lanka, Pakistan, China, Bangladesh, Myanmar, Malaysia, Japan, Papua, New Guinea, Solomon Islands, Australia.	sp. (Lauraceae), *M. doltsopa* etc. A: flowers and fermenting fruits *Lantana* spp.
15. *Pachliopta aristolochiae aristolochiae* (Fabricius) [= *Tros aristolochiae* (Fabricius)] (Common Rose)	red bodied swallow tail, dorsally black, forewings discal areas paler with black fold stripes and well marked pale vein stripes, hind wings with prominent tails, 5 elongated white discal spots and red submarginal spots, ventrally red discal spot in the anal area of forewings and they proximally reduced in hind wings, resembles females of common mormon *P. polytes polytes* and the rare wind mill *Pachliopta latrielli*, bright red body and spots (warning colouration) deter predators and convey that it is distasteful, common during rainy season, males emit strong and slightly pungent odour, six subspecies, the two common *P. a. aristoloctinae* and *P. a. diphilus* fly together, wing span 85mm.	plains, open fields and low altitudes found in South East Asia, India, Sri Lanka, Bangladesh, Malaysia, Thailand, Indonesia, Philippines, China, Sunda Islands.	L: *Aristolochia griffithi,* Indian birthwort *A. indica and A. tagala* (Aristolochiaceae), curryleaf *Murraya koenigi* (Rutaceae) etc. A: *Lantana* spp.
16. *Pachliopta hector* (Linnaeus) [=*Tros hector* (Linnaeus)] (Crimson Rose)	dorsally bluish black, forewings with interrupted and irregular discal and apical white bands, hind wings with almost spherical discal bands and a row of marginal bright crimson crescent spots, females have broader bands and spots, ventrally forewings brownish black hind wing black, markings as dorsally but with larger crimson crescent spots, both sexas have tails, avian predators are repelled by the characteristic bright crimson body and spots, wingspan 90-120mm.	plains and hills throughout India, mainly south of Godavari river, along the east coast of Orissa, South Bihar, West Bengal and the Andamans.	L: Indian birthwort and other members of Aristolochiaceae A: *Lantana* spp.
17. *Pachliopta pandiyana* Moore [=*Tros jophon* (Gray)] (Malabar Rose/Ceylon Rose)	dorsally predominantly black with greyish white and dirty red spots, forewings have prominent broad, triangular median bands formed by pale brownish, white streaks between the veins, dorsal cells in the hind wings greyish white and the hind wings have series of dirty red marginal spots, a large posterior discal yellowish patch, a submarginal series of crimson lunules and a prominent tail, wingspan 100-130mm.	moist wet forest areas, endemic to Western Ghats India and Sri Lanka, at altitudes 300 - 1000m.	L: members of Aristolochiaceae A: *Lantana* spp.
18. *Papilio crino* Fabricius (Common Banded Peacock)	magnificiant green-blue iridescent while flying, dorsally brownish and heavily dusted with green scales, wings have bluish green discal bands that pointed towards apices in males, a red / crimson semilunar marking in the apex of hind wings separates the bands between the wings, hind wings with a red-tinged black ocellus in the torsus and a green or blue-tipped tail, bands broader in males, ventrally pale greenish brown to blackish brown with clear bands, wing span 80-100 mm.	dry forest areas up to 2000m altitude, throughout India and Sri Lanka.	L: satinwood tree A: flowers, *Lantana* spp.
19. *Papilio demoleus* Linnaeus (Lime / Lemon Butterfly / Citrus Butterfly / Lime Swallowtail / Chequered Swallowtail)	dorsally blackish brown and speckled with yellow spots, tailless, the anal areas of hind have brick red oval spots (false eyes), anteriorly bordered with blue lunule at the inner margin and bluish spot near the costal margin, yellow wavy markings at the bases of both forewings and hind wings, ventrally forewings almost black with 7 yellow streaks at the base and a few orange spots, hind wings with blue bordered orange spots in the middle, markings become deep orange in older flies, wingspan 80-100mm.	forests, plains and damp areas, common throughout India, Sri Lanka, Pakistan, Arabia, Bangladesh, Myanmar, Malaysia, Indonesia, Thailand, Philippines, South China, Taiwan, Papua New Guinea and Northern Australia.	L: babchi *Psoralea corylefolia* (Fabaceae), ber *Zizyphus mauritiana* (Rhamnaceae), *Citrus* spp., *Murraya* spp., bael *Aegle marmelos,* garden rue *Ruta graveolens, R. chalepensis,* Malay glycosmis *Glycosmis pentaphylla*, limeberry *Triphasia trifolia* (Rutaceae), East Indian satinwood, *trifolia Chloroxylon swietenia* (Flindersiaceae), wood apple etc. A: flowers
20. *Papilio helenus daksha* Moore [=*Papilio helenus* (Linnaeus)] (Red Helen)	black bodied swallow tail with prominent tail, dorsally blackish brown, forewings with indistinct golden yellow scales between the veins, hind wings with a large creamy white discal patch and a series of indistinct, crimson red crescent markings in the margin those are more prominent in females, ventrally as in dorsal side but with complete row of marginal crescents, wingspan 110-130mm.	damp places in evergreen forests with heavy rainfall, throughout the year in India especially in the Western Ghats the Nilgiris, Palani Hills, Shevroys, Coorg, Mussoric and Assam in India, Sri Lanka, Pakistan, Nepal, China, Bangladesh, Myanmar, Malaysia, Indonesia, Thailand, Hong kong and Japan.	L: orange *Citrus reticulata*, lime *Citrus aurantifolia*; pomela *Citrus decumana*, *Citrus* spp., Malay glycosmis *Zanthoxylum rhetsa* (Rutaceae) etc. A: --
21. *Papilio polymnestor* Cramer (Blue Mormon)	tailless, head, thorax and abdomen uniformly blackish brown, the second largest swallowtail butterfly in South India, dorsally forewings black with blue discal bands that decrease in size towards the apex and traversed by black stripes along the veins, an elongate red spot slightly visible at the base of the cell, dorsally hind wings more or less blue with discal marginal and terminal series of black spots, hind wings black at the base	damp places in wet evergreen forests, throughout India, Sri Lanka, Pakistan, Bangladesh and Myanmar.	L: members of Rutaceae, especially pomelo, Malay glycosmis*,* Indian atlantia *Atlantia monophylla*, wild orange *Toddalia asiatica*, garcinia, *Paramigyna monophylla, Citrus* spp. etc. A: flowers, droppings etc.

Butterfly	Diagnostic morphological features	Habitat range	Larval and adult food
	and have 5 small irregular red patches at the base of cell, ventrally opaque black, females slightly larger and duller, wingspan 120-150mm.		
22. *Papilio polytes polytes* (Linnaeus) (Common Mormon)	black bodied swallow tail, sexually dimorphic, female trimorphic, males dorsally black with cream (whitish to yellowish) spots on hind wings, two morphs mimicks with two redbodied swallowtails one with crimson rose (*P. hector*) and the other with common rose *P. aristolochiae*, the third rare morph of female resembles male, wing span 100mm.	forests and plains at low elevations throughout India, Sri Lanka, Nepal, Bhutan, China, Bangladesh, Myanmar, Japan, Philippines, Moluccas; commonly occuring near human habitations especially in the gardens cultivated with curry leaf, orange, lemons etc.	L: *Citrus* spp., *Murraya* spp. bael, Malay glycosmis garden rue and other garden plants of Rutaceae etc. A: fond of flowers of divi-divi *Caesalpinia coriaria, Acacia, Cassia* spp. (Fabaceae) etc.
23. *Pathysa nomius nomius* Esper (Spot Sword / tail / Five Bar Swordtail)	white, each forewing is crossed with five broad black bands and the broader outer band is traversed by a row of submarginal white spots, hind wings are large and possess 2 black elongated subbasal bands and a broader outer band traversed by 6 white lunular spots with long black tail, ventrally white markings as above but bronze brown hind wings with black broken discal band having a series of red spots edged with black, wingspan 75-90mm.	forests usually below 1000m, mostly among bushes with lesser secondary growth, throughout Oriental region.	L: *Polyalthia cerasoides, M. tomentosa* and other plants of Annonaceae. A: --
24. *Triodes minos* Cramer [=*Triodes helena* (Linnaeus)] (Southern Birdwing)	largest Indian butterfly, 7' wing span, sexually dimorphic, dorsally forewings glossy black with white bordered veins, prominent grey-white vein stripes in females, dorsally hind wings golden yellow with black discal triangular spots which are larger in females, ventrally forewing vein stripes more prominent, wingspan 140-190mm.	forest patches, abundant in Western Ghats during monsoons and immediate post-monsoon months, also found in Sri Lanka	L: Indian birthwort, *A. tagala, A. griffithi, Thottea wallichi, T. siliquosa* (Asclepiadaceae) *Aristolochiae* spp. etc. A: fond of flowers of *Lantana* spp., *Marsdenia* spp., etc.

Table 2. Months of abundance, duration of flight, mode of flight and associated habits, mimicry and conservation status of butterflies of Kalakad Mundanthurai Tiger reserve.

Butterfly	Months of abundance			Duration of flight 7-9	9-1	1-5	Mode of flight and associated habits	Mimicry	Conservation status
Acraeidae									
1. *Acraea violae* Fabricius [=*Telchinia violae* (Fabricius)] (Tawny Coster)	Oct = Nov. (50+)	>Dec. (30+)	>Sep. (10+)	-	***	*	flies close to the ground, slow and fluttering unsteadily, resembling many danaids, frequently settles on flowers and often found basking at early morning hours, exudes an yellowish, bad smelling, oily liquid when disturbed.	absent	common, not protected
Danaidae									
2. *Parantica aglea aglea* Cramer [=*Danais aglea* (Cramer)] (Glassy Blue Tiger)	Oct. = Nov. (50+)	>Dec. (30+)	>Sep. (10+)	-	**	*	slow and lazy flier unless frightened and disturbed, weak flier when compared to other tigers, known migrant, frequents damp patches, retires from hot weather, clings to tree branches in hundreds at shade in dense forests.	Mullerian	common, not protected
3. *Danaus chrysippus chrysippus* (Linnaeus) (= *Danais chrysippus* Linnaeus) (Plain Tiger, African Monarch, African Queen, Lesser Wanderer)	Oct. = Nov. (200-)	>Dec. (100+)	>Sep. (100)	**	***	**	slow, undulating and strongest flier of the genus *Danaus*, remains on wing for longer period i.e., flying from dawn to dusk, settling in flowers for a moment to siphon nectar and continually moving from flower to flower.	mimicked by danaid female eggfly *Hypolimnas misippus*, Indian frittilary *Argyrens hyperbius hybrida*, leopard lacewing *Cethosia cynae* etc.	very common, not protected
4. *Tirumala limniace exoticus* Gmelin [=*Danais limniace leopardus* (Butler)] (Blue Tiger)	Nov. = Dec. (100-)	>Oct. (50+)	>Sep. (20+)	-	***	**	slow and lazy flier, fluttering wings majestically and vigorously in wooded places and hedges, while alighting on flowers keeping wings spread and remains motionless while siphoning nectar, rapidly flying when disturbed, congregate in large nubmer.	Mullerian	fairly common, not protected
5. *Tirumala septentrionis dravidasum* Fruhstor [=*Danais melissa* (Cramer)] (Dark Blue Tiger)	Oct. = Nov. = Dec. (500-)		>Sep. (100)	-	***	**	slow and lazy flier, active throughout the year in South India, congregate in large number during wet weather, common migrant in S. India, found in Himalayas below 2700 m during autumn and spring.	Mullerian	rare, needs protection

Butterfly	Months of abundance			Duration of flight 7-9	9-1	1-5	Mode of flight and associated habits	Mimicry	Conservation status
6. *Danais nilgiriensis* (Nilgiri Tiger)	Nov. = Dec. (20+)	>Sep.	=Oct. (10+)	-	**	*	slow and active flier throughout the year	Mullerian	common, protected
7. *Danaus genutia genutia* (Cramer) [=*Danais plexippus* (Linnaeus)] (Common Tiger / Striped Tiger / Monarch Butterfly)	Dec. = Nov. (300-) (250+)	> Oct. (200+)	>Sep. (100)	-	***	*	highly dispersed, slow and lazy flier, active throughout the year.	mimicking palmfly *Elymnias nesaea* and the lacewing *Cethosia*	common, protected
8. *Euploea core core* (Cramer) (Common Indian Crow)	Oct. = Nov. (5000+)	>Dec. (3000-)	>Sep. (500+)	-	***	?	slow flier, settles on shady trees at places in wet and damp areas during daytime, male often sails with its curved abdomen and extended powder puff-like yellow hair pencils, strong migrant, resting in large number before and during migration.	mimicked by common mine *C. clytia*	very common due to its polyphagous nature not protected
9. *Idea malabarica* Moore[=Hestialyncens (Moore & de Niceville)] (Malabar Tree Nymph / Floater / Silver Paper Fly / Spectre)	Nov. > Dec. (20+)	>Oct. (15-) (10+)	>Sep. (5+)	-	***	*	very slow and wafting, slowest flier among Indian butterflies, flies gracefully high in groups of four to five in thick forests, hovering effortlessly at one spot, riding the air with its large wings, swiftly escapes when alarmed, ascends to the tree tops by lazy flapping of wings and then sails down slowly in wide circles by keeping the wings spread out like large white flowers to water surfaces where it flutters for a moment then rises again tree tops.	absent	very rare, needs protection
Libytheidae									
10. *Libythea lepita* Moore (Common Beak)	Oct. = Nov. (50+)	>Dec. (30-)	(10+)	-	***	*	very rapid and darting flier, skipping and sailing, settles at wet / damp places, gets easily frightened and flies off when disturbed but not far away and returns again	absent	not common, needs protection
Papilionidae									
11. *Chilasa clytia* (Linnaeus) (Common Mime)	Oct. = Nov. (50+)	>Dec. (30-)	>Sep. (10+)	-	***	*	slow and lazy flier but rapid when disturbed, fond of circling around tree tops for hours together during warm and sunny in the monsoon season, seen along with its model *E. core* but comparatively uncommon.	mimicks common crow *E.core var. dissinilis* and blue tiger *T.limniace exoticus*	rare, schedule I Part IV
12. *Graphium agamemnon menides* Felder and Felder [= *Zetiges agamemnon* (Linnaeus)] (Tailed Jay)	Nov. > Oct. (200-)	>Dec. (150+) (100+)	>Sep. (10-)	-	***	*	very fast flier, fond of continually visiting flowers, hovers over flowers but never settles, prefers low altitudes.	absent	common, not protected
13. *Graphium doson* C & R Felder (Common Jay)	Nov. > Oct. (300-)	>Dec. (200+) (150+)	>Sep. (10-)	-	***	*	not a strong flier, attracted to baits with rotting or fermenting fruits and carrions, visits flowers in damp places, fond of mud puddling, seen in association with *G. sarpedon* and *P. demoleus* in large congregation.	resembling *G. sarpedon*	common, not protected
14. *Graphium sarpedon tereden* Felder & Felder = [*Zetides sarpedon* (Linnaeus)] (Common Blue Bottle Triangle)	Oct. = Nov. (500-)	>Dec. (300+)	>Sep. (100-)	-	***	*	strong flier but nervous and restless, hovers from flower to flower, attracted to foul smelling/ fermenting fruits and insects or other meat, congregate in large number in wet places, does mud pudding.	resembling *G. doron*	common, not protected
15. *Pachliopta aristolochiae aristolochiae* (Fabricius) [=*Tros aristolochiae* (Fabricius)] (Common Rose)	Oct. - Nov. (100)	>Sep. (10)	= Dec. (10)	*	***	*	slowl flier, flier at ease flutters from flower to flower of Fabaceae in search of nectar, migrating and roosting in large number with crimson rose *P.hector*.	mimicked by bimorphic female of common mormon *P.polytes romulus;* female of Zygaenid moth *Hista niigira* is a fine example of comimick of this species	common, not protected
16. *Pachliopta hector* (Linnaeus) [=*Tros hector* (Linnaeus)] (Criimson Rose / Common Mormon)	Oct. = Nov. (50)	>Dec. (30)	>Sep. (10)	-	***	*	slow and steady flier, fond of settling down in flowers, strong migrant, congregate and roost in thousands.	mimicked by female of *P. polytes romulus*	common, schedule I Part IV
17. *Pachliopta pandiyana* Moore [=*Tros jophon* (Gray)] (Malabar Rose / Ceylon Rose)	Oct.= Nov. (50)	>Dec. (30)	>Sep. (10)	-	***	-	very fast flier, flies deep inside the dense forests around the lower canopy, feeds on flowers during early morning and keeps high in the canopy during day time, even in heavy rains, low flight resembling Malabar tree nymph *I. malabarica* in action.	resembling red bodied swallowtails	rare, needs protection

Butterfly	Months of abundance			Duration of flight 7-9	9-1	1-5	Mode of flight and associated habits	Mimicry	Conservation status
18. *Papilio crino* Fabricius (Common Banded Peacock)	Oct. = Nov. (100)	=Dec. (100)	>Sep. (10)	-	***	-	very fast flier with wavering flight, hovers over flowers, occurs in plains and hills up to 2000m, frequents open forest, forest clearings, damp patches etc. abundant during South-West monsoon.	absent	rare, not threatened also abundant during April - May.
19. *Papilio demoleus* Linnaeus (Lime / Lemon Butterfly / Citrus Butterfly / Lime / Chequered Swallowtail)	Oct. = Nov. (5000)	>Dec. (3000)	>Sep. (1000)	-	***	*	fast and strong on the wing throughout the year, swarms during North-East monsoon (October to November), aggregate in hundreds in wet damp patches along road sides, river beds to drink water.	absent	very common, not as protected, considered minor pest (larvae) of *Citrus* species.
20. *Papilio helenus daksha* Moore [= *Papilio helenus* (Linnaeus)] (Red Helen)	Nov. = Dec. (100-)	>Oct. (50+)	>Sep. (10+)	-	**	*	powerful, rapid and irregular flier, while resting, though wings kept open white patches in the hind wings get concealed.	absent	not rare and not protected
21. *Papilio polymnestor* Cramer (Blue Mormon)	Oct. > Nov. (300-) (200-)	>Dec. (150+)	>Sep. (100)	-	***	*	swift and rapid flier with dipping flight, attracted to fermenting or foul smelling substances especially animal droppings e.g. otter, not found in dry and low rainfall areas, males often found drinking on wet mud or sand at the commencement of monsoons, wings held horizontally at rest.	absent	common, not protected
22. *Papilio polytes polytes* (Linnaeus) (Common Mormon)	Oct. = Nov. (1000+)	>Dec. (500+)	>Sep. (100)	-	***	*	moderate flier, flies close to the ground among bushes, hedges etc. but does not frequent wet places, males are swift fliers than females.	mimicks *P. aristolochiae* and *P. hector*.	common, not protected
23. *Pathysa nomius nomius* Esper (Spot Sword tail / Five Bar Swordtail)	Oct. (10+)	>Nov. (5+)		-	***	*	fast and straight flier, flying close to the ground and often settles on dry twigs with closed wings, nervous and rapid when disturbed, visits damp patches, mud puddles during hot weather.	absent	very rare, needs protection
24. *Triodes minos* Cramer [= *Triodes helena* (Linnaeus)] (Southern Birdwing)	Oct. > Dec. (40+) (30+)	>Nov. (25+)	>Sep. (10-)	**	**	**	slow and roaring flier, usually above the trees, active during early morning hours, frequents shady places, comes down from tree tops to feed on flowers.	absent	rare, commercially exploited cited in CITES

* / ** / *** indicate the relative abundance.