



**Section B**  
**Research Papers**



## Preliminary Study of Butterfly Diversity From Thane City and Forest Around Thane, Maharashtra

Amol Patwardhan\* and Poonam Kurve\*\*

\*Conservation Action trust, 6 E-1, Court Chambers, 35 New Marine Lines, Mumbai 400020, Maharashtra, India \*amolppatwardhan@yahoo.com,

\*\*B.N. Bandodkar College of Science, Chendani, Bunder Road, Thane 400 601, Maharashtra, India

**Abstract:** Thane city lies north to Mumbai city and is blessed with different types of ecosystems around it. Sanjay Gandhi National Park (SGNP) popularly known as Borivli national park is spread over 103 sqkm and is sandwiched between Thane and Mumbai city. The park is divided into 3 ranges viz. Borivli, Yeoor and Nagla. Yeoor and Nagla ranges are in Thane district and are to the West and North West of Thane city. Yeoor is degraded deciduous type of the forest and Nagla is moist deciduous type of forest. City has some mangroves on the west bank of Thane creek and southern bank of Ulhas river estuary. Comparative study of butterfly diversity in Thane city, Yeoor block and Nagla block was done from 2004 to 2006 in summer, monsoon, post monsoon and winter. Total 123 species were recorded. 62 species from Thane city, 123 species from Yeoor and 116 from Nagla block. A list of butterflies breeding in Thane city has also been included.

**Key words:** Butterfly diversity, Thane, Western ghats, Yeoor, Nagla.

---

### Introduction:

Thane city lies north of Mumbai metropolitan on the same island. The city is unique in terms of different types of ecosystems as it is a part of North Western Ghats. On the West and North West are Yeoor and Nagla ranges of Sanjay Gandhi National Park respectively which are hilly and densely covered by deciduous forest. Pejaver and Borkar (2001) studied vascular flora of Yeoor region thereby reporting 60 species of butterflies. On the East of the city is Thane creek and on the North East is Ulhas river estuary with very less to very good mangrove belt along both the banks.

Aitkin and Comber (1903) reported 95 species from Mumbai and surroundings. Best (1951) reported 105 species from Bombay and Salsette. Gaonkar (1996) reported 200 species from northern Western Ghats. Kunte (1997) studied seasonal patterns of some butterflies around different locations near Pune. Kurve and Pejaver (2004) reported 41 species from the campus of B.N. Bandodkar College, Thane. Kurve and Patwardhan (2005) reported 56 species from Thane city, 110 from Yeoor and 104 from Nagla area in a project submitted to the University of Mumbai.

### Materials and Methods:

The study was carried out during all seasons of 2004 to the first half of 2007. All the study areas were visited twice a month from 7:30 am till 12:00 noon in different seasons i.e. summer (Feb-May), monsoon (June-Sept), post monsoon (Oct- mid Nov) and winter (mid Nov-Jan). In Yeoor and Nagla a single route of 3 km and 2 km respectively was followed along forest path. In Thane city, observations were done along different roads. The butterflies were recorded as

VC- very common, C- common, UC-uncommon, R-rare, A-absent based on visual observations, no population study was done. The scientific names were adopted from Wynter Blyth (1957), Evans (1932), Haribal (1992) and Kunte (2000).

### About study area:

The study area was comprised of three places in and around Thane city as follows.

**1. Thane city** represents the urbanized locality of the study. Since the city is spread over a vast area, it was not possible to cover each area. Hence three different locations in Thane city were selected based on uniqueness in the locality.

A) B.N.Bandodkar college campus (19°11'20.87" N, 72°58'50.25" E): It is spread over 13.5 acres of land along east bank of the Thane creek. Adjoining the creek there are mangroves and their associates. There is a big garden with a walk way in the campus. Various ornamental nectar plants like *Lantana camara*, *Verbina* species, *Vernonia*, *Heliotropium*, etc. which attract butterflies.

B) Naupada (19°11'24.25" N, 72°58'10.36" E): This is an entirely residential area with few food as well as nectar plants. However there are some food plants like *Ficus bengalensis*, *Ficus religiosa*, *Ficus glomerata*, *Calotropis gigantea*, *Polyalthia longifolia*, *Artabotrys indica*, *Nerium sp.* *Riccinus communis* etc. The municipality has planted avenue plants like *Peltoforum pterocarpum*, *Alstonia scholaris* and *Ficus benjamina* which are not the food plants but one of them is *Anthocephalus kadamba* is the food plant of commander butterfly *Moduza procris*, this species of

like *Lantana camara*, *Verbina* species, *Vernonia*, *Heliotropium*, etc. which attract butterflies.

B) Naupada (19°11'24.25" N, 72°58'10.36" E): This is an entirely residential area with few food as well as nectar plants. However there are some food plants like *Ficus bengalensis*, *Ficus religiosa*, *Ficus glomerata*, *Calotropis gigantea*, *Polyalthia longifolia*, *Artabotrys indica*, *Nerium sp.* *Riccinus communis* etc. The municipality has planted avenue plants like *Peltoforum pterocarpum*, *Alstonia scholaris* and *Ficus benjamina* which are not the food plants but one of them is *Anthocephalus kadamba* is the food plant of commander butterfly *Moduza procris*, this species of butterfly was seen in the city and there is probably a breeding population.

C) Vartak Nagar (19°12'30.72" N, 72°57'29.48" E): is approximately 4 km from Thane railway station. Area is close to Yeoor hills. There are many new Real Estate complexes have come up with good gardens with many nectar plants.

**2. Yeoor block** (19°14'14.98" N, 72°56'42.19" E; approx. 110 MSL): This is a part of Sanjay Gandhi National Park. It has around sixty square kilometer of deciduous forest and has a moist and warm climate. Forest has tall trees like *Terminalia tomentosa*, *Tectona grandis*, *Holoptelea integrifolia*, *Madhuca indica* along with the shrubs like *Cassia*, *Heliotropium indicum*, *Chrotolarea juncea*, *Flaccourtia* and *Acacia*. Approximately 150 types of plants including the tall trees, herbs, shrubs and climbers are present in the forest (Pejaver and Borkar, 2001). The average height of the trees is around fifty feet. Undergrowth is very high which comprises of shrubs like *Helicteres isora*, *Woodfordia floribunda*, *Leeha*, *Cesus woodroii* and climbers like *Calycopteris floribunda*, *Tinospora cordiflora*, *Butea superba* etc. Due to the easy access from Thane city, Yeoor has become a degraded forest and is more prone to anthropogenic activities. On Sundays, especially in monsoon it experiences heavy pressure from general tourists.

**3. Nagla block** (19°17'48.98" N, 72°54'31.88"E; ; approx. 75 MSL): Nagla block, the third block of Sanjay Gandhi National Park, situated at the 20 km north of Thane city adjoining the northern bank of Ulhas River Estuary. The forest type is semi-moist, dry deciduous, characterized by plants like *Cordia dichotoma*, *Lania grandis*, *Haldina cordifolia*, *Putranjiva roxbergii*, *Schlichera oliosia*, *Morinda tinctoria*, *Magnolia sp.*, *Terminalia tomentosa*, *Holerhina antidysentrica*, *Wrightia tinctoria*, *Garuga pinnata*, *Diospyros melanoxylon*, *Madhuca indica*, *Chukrasia fabelifer*, *Pongamia pinnata*, *Meswak* *Salavadora persica* and different types of climbers. Undergrowth is lesser than that of Yeoor due to the dense canopy of the evergreen trees. Parts of Nagla block adjoining the estuary shows presence of mangroves such as *Avicennia marina*, *A.m. acutissima*,

*Sonneratia apetala*, *Acanthus ilicifolius*, *Excoecaria agallocha*, *Bruguiera cylindrica*, *Rhizophora mucronata*, *Ceriops decandra* and *Ceriops tagal*. Nagla block has lesser human interference compared to Yeoor as it is distantly placed but is infested by some illegal breweries of country liquor.

## Results and Discussion:

Total 123 species were recorded from all the study areas. (**Table 1 and 3**). Butterflies of family Papilionidae showed comparatively less variation in number of species than other families. Both forms of common Mime, form *clytia* mimicking common crow and *dissimilis* mimicking blue tiger were seen in Yeoor but were uncommon in general.

Along with common form of female wanderer a *philomela* form was seen once on 4<sup>th</sup> November 2006 in Yeoor. Form *catila* of Common emigrant female was seen on 3<sup>rd</sup> March 2006 puddling on wet soil. One specimen, male of Chocolate albatross *Appias lycnida* was recorded on 29<sup>th</sup> October 2006 in Yeoor.

The field identification of Line blues *Prosotas spp.* was difficult hence were regarded as a single species.

On 21<sup>st</sup> March 2005 *inaria* form of female danaid eggfly was seen in the dried bed of a water stream. This form is characterized by absence of black color on the apex of fore wing.

Black rajah was regarded as 'Not Rare' by Evans (1932) and Wynter Blyth (1957), was seen more in college campus probably due to the presence of the food plant, Tamarind *Tamarindus indicus* in more number. Blue pansy *Junonia orythia* and Yellow pansy *Junonia hierta* were seen commonly only in summer (Feb-May) and not during rest of the year. Painted lady *Cynthia cardui* is a migrant in the area. It arrives in post monsoon season and can be easily seen in Thane city and Yeoor till Feb-Mar.

Among hesperids, there were at least three species of swifts. Rice swift *Borbo cinnara*, Bevan's swift *Pseudoborbo bevani* and probably conjoined swift *Pelopidas conjuncta*. But their field identification was a bit difficult hence recorded as one species.

Overall it was found that butterfly diversity was higher in forest areas. The order of dominance can be represented as Yeoor (123 species) > Nagla (116 species) > Thane city (62 species). It was also found that butterflies were seen commonly at forest clearings rather than dense patches.

**Table 1. Family wise diversity of butterflies in Thane city, Yeoor and Nagla block.**

	Thane	Yeoor	Nagla
Papilionidae	8	10	10
Pieridae	13	16	14
Lycaenidae	13	39	39
Nymphalidae	24	39	38
Hesperidae	4	19	16
<b>Total</b>	<b>62</b>	<b>123</b>	<b>116</b>

**Thane city:**

In Thane city 62 species were observed. Butterflies from family Nymphalidae showed maximum species diversity with 24 species. Papilionidae and Pieridae represented by 8 and 13 species respectively and from Hesperidae family, only 4 species were recorded. The family Lycaenidae was represented by 13 species. However, the diversity was less in Naupada and Vartak Nagar area of the City. Maximum numbers of species, 56 were recorded from the campus area of Bandodkar College. Most of the butterflies visited the campus for nectar.

There are some species that breed within city limits. However, the ever expanding city limits are yet to be explored. The list of species that were found breeding is given in the Table 2.

**Table 2. List of butterfly species breeding in Thane city.**

No.	Species	Food plant
1	Common mormon <i>Papilio polytes</i>	<i>Aegle marmelos</i>
	Common rose <i>Pachliopta aristolochiae</i>	<i>Aristolochia spp.</i>
2	Common crow <i>Euploea core</i>	<i>Nerium indicum,</i>
3	Blue tiger <i>Tirumala linniae</i>	<i>Wattakaka</i>
4	Plain tiger <i>Danus chrysippus</i>	<i>Ficus glomerata,</i>
5	Common grass yellow <i>Eurema hecabe</i>	<i>Cassia tora</i>
6	Common emigrant <i>Catopsilia pomona</i>	<i>Cassia fistula</i>
7	Salmon Arab <i>Colotis amata</i>	<i>Salvadora</i>
8	Red Pierrot <i>Talicauda nyseus</i>	<i>Bryophyllum sp.</i>
9	Tailed jay <i>Graphium Agamemnon</i>	<i>Polyalthia</i>
10	Common jay <i>Graphium doson</i>	<i>Michlea</i>
11	Common baron <i>Euthalia aconthea</i>	<i>Mangifera indica</i>
12	Tawny coaster <i>Acraea violae</i>	<i>Passiflora sp.</i>
13	Common castor <i>Ariadne merione</i>	<i>Riccinus</i>
14	Grass demon <i>Udaspes folus</i>	<i>Hedychium</i>
15	Indian Palm bob <i>Suastus gremius</i>	Ornamental palm

**Yeoor block:**

Even though there's been a continuous disturbance of human activities, Yeoor showed rich diversity of butterflies. Total 123 species were recorded. 10 species of family Papilionidae were observed and from family Pieridae 15 different species were recorded with a single spotting of Salmon arab *Colotis amata* on 10<sup>th</sup> October 2004. There is no food plant of Salmon arab present in Yeoor. The most probable reason for the sighting would be due to wind drift from nearby creek area.

From family Lycaenidae and Nymphalidae 39 species were recorded each. Butterfly density and diversity was the maximum in monsoon (July–Sept) and post monsoon (Oct–Nov). During summer, maximum diversity was seen along the drying streams and most of the lycaenids were seen in good number puddling on wet soil. 19 species of hesperids were seen with most commonest being Grass demon *Udaspes folus*, Plain banded awl *Hasora vitta*, Chestnut bob *Iambrix salsala* and Dark Palm dart *Telicota ancilla*. Wynter Blyth (1957) reported that Vindhyan bob *Arnetta vindhiana* is common around Thane city. This species is more common in dry season (Feb–May). A one specimen of Silverstreak blue *Iraota timeleon* was seen dying in water stream on 4<sup>th</sup> March 2007.

**Nagla block:**

Total number of species recorded during the study period is 116. Nymphalidae was co-dominant family with Lycaenidae with 39 species each. Salmon arab *Colotis amata* was very common along estuary. Out of 16 species recorded from Hesperidae family, Common red eye *Metapa aria* and Common grass demon *Udaspes folus* were common than the other species of skippers.

**Table 3. List of butterflies recorded from three habitats.**

Sr. No.		Thane	Yeoor	Nagla
	<b>Papilionidae</b>			
1	Common rose <i>Pachliopta aristolochiae</i>	C	VC	VC
2	Crimson rose <i>Pachliopta hector</i>	C	C	C
3	Common mime <i>Chilasa clytia</i>	A	UC	UC
4	Lime butterfly <i>Papilio demoleus</i>	C	VC	C
5	Common mormon <i>Papilio polytes</i>	C	C	C
6	Blue mormon <i>Papilio polymnestor</i>	UC	C	C
7	Common blue bottle <i>Graphium serpedon</i>	UC	C	C
8	Common jay <i>Graphium doson</i>	C	C	C
9	Common tailed jay <i>Graphium agamemnon</i>	C	C	C
10	Spot swordtail <i>Pathysa nomius</i>	A	C	C
	<b>Pieridae</b>			
11	Common jezebel <i>Delias eucharis</i>	C	C	C
12	Psyche <i>Leptosia nina</i>	UC	C	C
13	Common gull <i>Cepora nerissa</i>	UC	C	C
14	Pioneer <i>Anaphaeis aurota</i>	A	UC	R
15	Small Salmon arab <i>Colotis amata</i>	C	R	C

16	Striped albatross <i>Appias libythea</i>	UC	UC	UC
17	Chocolate albatross <i>Appias lycida</i>	-	R	-
18	White orange tip <i>Ixias marianne</i>	A	C	C
19	Yellow orange tip <i>Ixias pyrene</i>	R	C	C
20	Great orange tip <i>Hebomoia glaucippe</i>	R	C	C
21	Common wanderer <i>Pareronia valeria</i>	C	C	C
22	Common emigrant <i>Catopsilia pomona</i>	C	C	C
23	Mottled emigrant <i>Catopsilia pyranthe</i>	C	C	C
24	Common grass yellow <i>Eurema hecabe</i>	C	C	C
25	Spotless grass yellow <i>Eurema laeta</i>	C	C	C
26	Small grass yellow <i>Eurema brigitta</i>	C	C	C
	<b>Lycaenidae</b>			
27	Common pierrot <i>Castalius rosimum</i>	C	C	C
28	Angled pierrot <i>Caleta caleta</i>	A	C	C
29	Red pierrot <i>Talicauda nyseus</i>	C	C	C
30	Rounded pierrot <i>Tarucus nara</i>	A	C	C
31	Zebra blue <i>Syntarucus plinius</i>	A	C	C
32	Dark grass blue <i>Zizeeria knysna</i>	UC	C	C
33	Pale grass blue <i>Pseudozizeeria maha</i>	A	C	C
34	Tiny grass blue <i>Zizula hylax</i>	A	R	R
35	Grass jewel <i>Freyeria trochilus</i>	A	C	C
36	Gram blue <i>Euchrysops cnejus</i>	C	C	C
37	Pea blue <i>Lampides boeticus</i>	C	C	C
38	Common cerulean <i>Jamides celeno</i>	C	C	C
39	Metallic cerulean <i>Jamides alecto</i>	A	UC	UC
40	Dark cerulean <i>Jamides bochus</i>	R	C	C
41	Forget – me – not <i>Catochrysops strabo</i>	A	C	UC
42	Pointed ciliate blue <i>Anthene lycaenina</i>	A	C	C
43	Line blue <i>Prosotas spp.</i>	UC	C	C
44	Common acacia blue <i>Surendra quercetorium</i>	A	UC	UC
45	Silverstreak blue <i>Iraota timeleon</i>	A	R	R
46	Large oak blue <i>Arhopala amantes</i>	A	C	C
47	Leaf blue <i>Amblypodia amita</i>	A	C	C
48	Hedge blue <i>Acetolepis puspa</i>	C	C	C
49	Peacock royal <i>Tajuria cippus</i>	A	UC	UC
50	Common guava blue <i>Virachola isocrates</i>	A	R	R
51	Indian cupid <i>Everes lacturnus</i>	A	C	C
52	Plains cupid <i>Chilades pandava</i>	A	C	C
53	Common silverline <i>Spindasis vulcanus</i>	R	C	C
54	Long banded silverline <i>Spindasis lohita</i>	A	C	C
55	Shot silverline <i>Spindasis ictis</i>	A	UC	UC
56	Yamfly <i>Loxura atymnus</i>	A	C	C
57	Monkey puzzle <i>Rathinda amor</i>	A	C	C
58	Indian red flash <i>Rapala iarbas</i>	R	C	C
59	Indian slate flash <i>Rapala manae</i>	A	C	C
60	Indigo flash <i>Rapala varuna</i>	A	UC	UC
61	Apelly <i>Spalgis epius</i>	A	UC	UC
62	Indian sunbeam <i>Curetus thetis</i>	A	C	C
63	Angled sunbeam <i>Curetis dentata</i>	A	C	C
64	Malayan <i>Megsiba malaya</i>	A	C	C
65	Plum judy <i>Abisara echerius</i>	UC	C	C
	<b>Nymphalidae</b>			
66	Common evening brown <i>Melanitis leda</i>	C	C	C
67	Bamboo tree brown <i>Lethe europa</i>	A	C	C
68	Common bush brown <i>Mycalasis persius</i>	A	C	C
69	Dark brand bush brown <i>Mycalasis mineus</i>	A	C	C
70	Long brand bush brown <i>Mycalasis visala</i>	A	R	R
71	Small long brand bush brown <i>Mycalasis igilia</i>	A	UC	UC
72	Common four ring <i>Ypthima huebneri</i>	A	UC	UC
73	Common five ring <i>Ypthima baldus</i>	A	C	C
74	Tawny rajah <i>Charaxes bernardus</i>	A	C	C
75	Black rajah <i>Charaxes solon</i>	R	R	R
76	Common nawab <i>Polyura athamas</i>	R	UC	UC
77	Anomalous nawab <i>Polyura agraria</i>	R	R	R
78	Black prince <i>Rohana parisatis</i>	A	R	A
79	Common castor <i>Ariadne merione</i>	C	C	C
80	Common leopard <i>Phalata phalantha</i>	UC	C	C

81	Yellow pansy <i>Junonia hierta</i>	A	C	C
82	Blue pansy <i>Junonia orithya</i>	A	C	C
83	Lemon pansy <i>Junonia lemonias</i>	A	C	C
84	Peacock pansy <i>Junonia almana</i>	UC	C	C
85	Grey pansy <i>Junonia atlites</i>	C	C	C
86	Chocolate pansy <i>Precis iphita</i>	C	C	C
87	Painted lady <i>Cynthia cardui</i>	UC	UC	UC
88	Danaid egg fly <i>Hypolimnas missipus</i>	C	C	C
89	Great egg fly <i>Hypolimnas bolina</i>	C	C	C
90	Blue oak leaf <i>Kallima horsfieldi</i>	R	C	C
91	Chestnut streaked sailer <i>Neptis jumbah</i>	A	C	C
92	Common sailer <i>Neptis hylas</i>	C	C	C
93	Short banded sailer <i>Neptis columella</i>	UC	C	C
94	Blackvein sergeant <i>Athyma perius</i>	A	R	R
95	Commander <i>Moduza procris</i>	UC	C	C
96	Common baron <i>Euthalia aconthea</i>	C	C	C
97	Gaudy baron <i>Euthalia lubentina</i>	A	UC	UC
98	Baronet <i>Symphadra nais</i>	R	C	C
99	Tawny coaster <i>Acraea violae</i>	C	C	C
100	Plain tiger <i>Danaus chryssipus</i>	C	C	C
101	Striped tiger <i>Danaus genutia</i>	C	C	C
102	Blue tiger <i>Tirumala limniace</i>	C	C	C
103	Glassy tiger <i>Parantica aglea</i>	C	C	C
104	Common crow <i>Euploea core</i>	C	C	C
	<b>Hesperiidae</b>			
105	Plain banded awl <i>Hasora vitta</i>	A	C	UC
106	Common awl <i>Hasora badra</i>	A	R	R
107	Brown awl <i>Badamia exclametonis</i>	A	C	C
108	Orange awlet <i>Bibasis jaina</i>	A	R	R
109	Malabar spotted flat <i>Celaenorrhinus ambareesa</i>	A	C	C
110	Tricolor pied flat <i>Coladenia indrani</i>	A	C	C
111	Common small flat <i>Sarangesa dasahara</i>	A	C	C
112	Golden angle <i>Caprona ransonnetti</i>	A	C	C
113	Angled flat <i>Tapena twaitthesi</i>	A	C	A
114	Bush hopper <i>Ampittia discoirides</i>	A	C	A
115	Chestnut bob <i>Iambrix salsala</i>	A	C	C
116	Indian Palm bob <i>Suastus gremius</i>	R	R	R
117	Vindhyan bob <i>Arnetta vindhiana</i>	A	C	R
118	Dark Palm dart <i>Telicota ancilla</i>	A	C	C
119	Grass demon <i>Udaspes folus</i>	UC	C	C
120	Indian skipper <i>Spialia galba</i>	R	C	A
121	Common red eye <i>Metapa aria</i>	UC	C	C
122	Swifts	C	C	C
123	Moore's ace <i>Haple porus</i>	A	C	UC

VC- very common, C- common, UC-uncommon, R-rare, A-absent.

### Acknowledgements

Authors are thankful to forest department for allowing to carry out the study, Kishen Das for providing the photocopy of Wynter Blyth and Janvavi Joshi for copy of Evans, Alka Bhagwat for old JBNHS references. The constant encouragement from department of Zoology, B.N.Bandodkar College, Thane is acknowledged.

### References:

- Aitkin, E. H. and Comber, E. 1903. A list of Butterflies of Konkan. *JBNHS* Vol. 15: 42-55.
- Aitkin, E. H. and Comber, E. 1903a. Further notes on Konkan butterflies. *JBNHS* Vol. 15: 356-357.

- Best, A. E. G. 1951. The Butterflies of Bombay and Salsette. *JBNHS*. Vol. 50: 331-339.
- Evans, W.H. 1932. Identification of Indian Butterflies. Second Ed. Revised. Published by Bombay Natural History Society (1985 reprint). pp. 454.
- Gaonkar, H. 1996. Butterflies of the Western Ghats, India (including Sri Lanka): A biodiversity assessment of a threatened mountain system. Report to the Centre of Ecological Sciences, Bangalore. 86 pp.
- Haribal, M., 1992. The butterflies of Sikkim Himalaya and their natural history. Published by Sikkim nature conservation foundation. 217pp.
- Kunte, K. 1997. Seasonal pattern in Butterfly abundance and species diversity in four tropical habitats in northern western ghats. *J.Bioscience* 22(5): 593-603.
- Kunte, K. 2000. Butterflies of peninsular India. Published by University Press(India) Ltd., Hyderabad. 254pp.
- Kurve P. and Pejaver, M. 2004. Butterflies of B.N.Bandodkar college campus, Thane, Maharashtra. *Insect environment* Oct-Dec 10 (3): 104-105.
- Kurve, P. and Patwardhan, A. 2005. Comparative study of butterflies from urbanized zone, degraded forest and core forest in around Thane city. *Minor project submitted to the University of Mumbai*. pp. VI + 68.
- Pejaver M.K., Borkar M.U. 2001. A contribution to the vascular flora, birds and butterflies of Yeoor hills and its enviorns. *Bioresearch Journal*. 13 (1): 23-32.
- Wynter Blyth 1957. Butterflies of Indian region. Reprint 1982, Today and tomorrow publisher, New Delhi. 523pp.

## Beautiful Butterflies of Sanjay Gandhi National Park

Shaunak Bhawalkar and Pratik Tambe

Dept. of Zoology, Patkar College, Goregaon (W), Mumbai-400062.

**Abstract** :In our project we have observed and identified 25 species of butterflies, with different genera; from Sanjay Gandhi National Park (S.G.N.P.) during year 2007-2008. We have also studied the habituation, feeding habits, and life-cycle, etc. and find the correlation and presence of butterflies in different seasons.

**Keywords** : S.N.G.P., butterflies

### Introduction

- It is estimated that about 15,000 species of butterflies inhabit the earth.
- India alone has 1501 species of butterflies. (<http://www.lcsd.gov.hk/green/butterfly/en/index.php> and [http://en.wikipedia.org/wiki/List\\_of\\_butterflies\\_of\\_India](http://en.wikipedia.org/wiki/List_of_butterflies_of_India))

Sanjay Gandhi National Park (S.G.N.P.) has been reported to have 150 species of butterflies. ([en.wikipedia.org/wiki/Sanjay\\_Gandhi\\_National\\_Park #Biodiversity](http://en.wikipedia.org/wiki/Sanjay_Gandhi_National_Park#Biodiversity))

In the present project the butterflies from two stations of S.G.N.P. were studied and reported.

### Materials and Methods

The butterflies from Sanjay Gandhi National Park were observed during year 2007-2008. The study was done at the Conservation Education Centre (C.E.C.) and the areas near Aarey Colony, Goregaon.

Photographs were taken by different models of Digital camera

Identification was done by referring [www.wikipedia.org](http://www.wikipedia.org)

### Result and Discussion

During the present study total 30 types of butterflies were observed in the study area of the Sanjay Gandhi National Park. However identification of 25 types was possible. According to earlier report ([en.wikipedia.org/wiki/Sanjay\\_Gandhi\\_National\\_Park #Biodiversity](http://en.wikipedia.org/wiki/Sanjay_Gandhi_National_Park#Biodiversity))

150 butterfly types have been identified from the National Park. The present diversity is much low. This could be because of our observations restricted to particular locations and seasonal variations. The list of the butterflies and photos of some butterflies are given below.

### List of butterflies.

1. Common name: Tailed Jay, Species: *Graphium Agamemnon*
2. Common name: Common tiger, Species: *Danaus genutia*.
3. Common name: Blue tiger, Species: *Tirumula limniace*
4. Common name: Common crow, Species: *Euploea core*
5. Common name: Common Sailor, Species: *Neptis hylas*.
6. Common name: Baronet, Species: *Euthalia nais*

7. Common name: Danied egg fly, Species: *Hypolimnas misippus*
8. Common name: Common rose, Species: *Atrophaneura aristolochae*
9. Common name: Common Mormon, Species: *Papilio polytes*
10. Common name: Crimson rose, Species: *Atrophaneura hector*
11. Common name: Lemon pansy, Species: *Junonia lemonias*
12. Common name: Chocolate Pansy, Species: *Junonia iphita*
13. Common name: Peacock Pansy, Species: *Junonia almana*
14. Common name: White Orange tip, Species: *Ixias marianne*.
15. Common name: Yellow Orange tip, Species: *Ixias pyrene*
16. Common name: Great Orange tip, Species: *Haebomoea gluacippe*
17. Common name: Psyche, Species: *Leptosia nina*
18. Common name: Blue Oak Leaf, Species: *Kallima horsfieldi*
19. Common name: Yam fly, Species: *Loxura atymnus*
20. Common name: Cerulean, Species: *Jamides bospp*
21. Common name: Common grass yellow, Species: *Eurema hecabe*
22. Common name: Commander, Species: *Limenitis procris*
23. Common name: Tawny coster, Species: *Acraea violae*
24. Common name: Spotted swordtail, Species: *Pathysa nomius*
25. Common name: Wanderer, Species: *Pareronia valeria*

### References

1. [www.wikipedia.org](http://www.wikipedia.org)
2. <http://www.lcsd.gov.hk/green/butterfly/en/index.php> an [http://en.wikipedia.org/wiki/List\\_of\\_butterflies\\_of\\_India](http://en.wikipedia.org/wiki/List_of_butterflies_of_India).
3. [en.wikipedia.org/wiki/Sanjay\\_Gandhi\\_National\\_Park #Biodiversity](http://en.wikipedia.org/wiki/Sanjay_Gandhi_National_Park#Biodiversity)



**PHOTOGRAPHS OF SOME BUTTERFLIES**

(According to the numbers given above).



**1 Tailed Jay**



**Glass Tiger**



**4 Common crow**



**6 Baronet**



**8 Common rose**



**17 Psyche,**



**18 Blue Oak Leaf**



**19 Yam fly**



**20 Cerulean,**



**24 Spotted swordtail**

## Observational Project on Life History of Plain Tiger Butterfly

M.V. Prabhu, V.R. Fernandes, Rahul Khot, Dr. M.N. Mukherji

**Abstract :** This work highlights the complete life cycle of *Danaus chrysippus chrysippus*. (Plain tiger butterfly of family nymphalidae (Lepidoptera). Observation regarding egg laying, egg hatching, pupa formation and adult emergence were recorded. Approximate duration taken by the plain tiger butterfly in each stage of lifecycle, viability of eggs and behavioral study of caterpillar stage is discussed further.

**Keywords :** Plain tiger, life cycle.

---

### Introduction

Butterflies are the most conspicuous and colorful of all insects. People have always been charmed by the delicate, gorgeously colored wings of butterflies. The beauty and grace of these insects have inspired artists and poets. Butterflies live almost everywhere in the world.

Insects are generally characterized by the following traits.viz;

- Body divided into head, thorax and abdomen
- Three pairs of jointed legs, one each on a thoracic segment
- Two pairs of wings, borne on the second and third thoracic segment

### Life cycle in butterflies

A butterfly begins its life as a tiny egg. Usually they are plant specific for laying eggs. Egg hatch into a caterpillar. The caterpillar spends most of its time eating and growing. But during this period, it casts off its outer skin layer; the caterpillar stage between two molts is called an instar. It repeats this process for several times, after the caterpillar grows completely it forms a protective case around itself. This process is called pupation or chrysalis formation, after few days adult butterfly emerges out of it.

### Material and Methods

Three day old eggs of plain tiger butterfly were collected from *Calotropis gigantea*. Eggs were reared in laboratory in 20"×30" container with proper aeration. Caterpillar was provided with fresh leaves of *Calotropis* every alternate day for feeding. Scale was used to measure the length of the caterpillar. Nikon cool pix4 camera was used to record observations during the project work. The whole life cycle was studied at room temperature.

### Observations

#### Eggs

The female plain tiger butterfly curled its abdomen to

reach the surface of the leaf to lay an egg. The female tiger butterfly lays 10 to 12 eggs, but lays only one egg at a time. Female butterfly perches on the plant frequently, due to this behavior it can be easily spotted while laying eggs. Earlier observation have emphasized that the eggs are laid on the under surface of the leaves of host plant *Calotropis gigantea*. However this study reveals that it can lay eggs on stem, base of the leaf, under side of leaf or on upper side and most of the time it lays egg along the midrib of the leaf. (Refer plate no. 2, 3, and 4).

Eggs are silvery white in color when laid and become pale yellow before hatching. Eggs are flat at base and tapering towards apex, some what pear shaped in appearance. Surface of eggs has fine ridges which start from base and merge at apex. It was observed that some eggs turn black in colors, which do not hatch, however the cause is not known.

#### Caterpillar

When caterpillar hatches out from the egg, its first meal is egg shell itself. It was observed that it measured about 0.3cm after having its first meal. It is cylindrical and some what transparent when seen through naked eyes. Hatching occurs in early morning hours i.e. from 5 a.m. to 7 a.m. Development of skin coloration starts from 2<sup>nd</sup> day and also tentacles like projections develop on 3<sup>rd</sup>, 6<sup>th</sup> and 12<sup>th</sup> segment. Caterpillar feeds by encircling the lower soft tissues of the host plant leaf leaving the upper cuticle and layer beneath it untouched, this may be due to underdevelopment of mandibles during young stages. When the caterpillar is of 1.5cm, it starts eating whole leaf. (Refer plate 7& 8)

The caterpillar stage lasts for 9 days. There are total 4 instars. Maximum size is 4.5 cm to 5 cm. in length. At this stage caterpillar is a voracious eater and eats 2-3 leaves of *Calotropis* in 24 hours. Tentacles grow large; skin is bluish with glossy effect, yellow spots and blue bands on dorsal side of body. It was observed that when tentacles become red in color at the base, caterpillar is fully grown and ready for pupation. (Refer plate 9).

#### Pupation

After full growth, caterpillar starts the process of

pupation. Actual process takes 3.00 min. However the process starts 12 to 13 hrs prior to those 3.00 min. Initially caterpillar starts searching for rigid support to attach itself by posterior end. As the caterpillar attaches itself to a rigid support, it starts contracting and coloration becomes dark yellow (these observations were recorded from 8.00 p.m. onwards).

Conditions remain same for next 4-5 hrs. By 12 a.m. caterpillar inverts in an upside down position. After 2 hours (2.30 a.m.) it was observed that shape of caterpillar was like inverted comma and remained in same position for next 4 hours (6.00 a.m.). Within next 2-3 hours body becomes pale yellow in color and tentacles become dry. (These observations were noted at 8.35 a.m.). Body of the caterpillar gives a wave motion from posterior end towards anterior end tearing off the external skin of the caterpillar and the cocoon or chrysalis comes out. At first the chrysalis looks like sticky semi solid substance but it hardens within few minutes. Coloration of the chrysalis was yellow first and later it may become white or green. (Refer plate 10, 11, 12).

### Adult Emergence

Pupation period is of seven days. During this 7 days span, amazing changes take place inside the pupa. 24 hrs. prior to emergence wing shade and coloration are visible from outside of chrysalis. Mouth of the butterfly is faced downwards when it emerges out. After emergence, the wings appear to be folded. It takes about 30 to 40 min. to stretch the wings completely. From time of emergence till its first flight the butterfly remains attached to the pupal case for 4-5 hours, by rotating through 180 degrees.

The wingspan of adult butterfly is 70-80mm (7-8cm). It was observed that forelegs of the butterfly are reduced to such an extent that it appears as butterfly has only 2 pairs of legs. This phenomenon is seen in other butterflies of s.family Danaïna such as Glassy Tiger, Stripped Tiger etc. The adult butterfly is tawny, medium sized black colored body spotted with spots on the thorax region. The apical half of the forewings is black and marked with a pure white band. The hind wing has three black spots approximately at the centre. The hind wing has a thin border of black enclosing a series of semicircular white spots.

Male danaines have a number of secondary sexual characteristics such as, the male has a pouch on the hind wing this spot is white with a thin black border and bulges slightly. It is a cluster of specialized scent scales used to attract females. Male also possesses 2 brush like organs which can be pushed out of the tip of the abdomen.

### Results and discussion

Observation was of male tiger butterfly. According to observations recorded it took 23 days from egg laying to

adult emergence. However it might differ by 2-3 days in natural conditions.

The 23 days span constituted of;

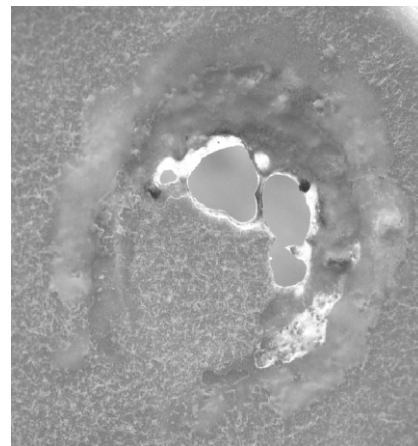
- Egg stage- 7 days
- Caterpillar stage- 9 days
- Pupal stage- 7day



butterfly laying eggs (plate1)



2 day old caterpillar (plate 2)



Feeding habit of young larva (plate 3)



Fully grown caterpillar (plate 4)



Reduced forelegs are not seen in case of glassy tigers also

#### TAXONOMY OF PLAIN TIGER BUTTERFLY

The **Plain Tiger** (*Danaus chrysippus*) or - outside Asia - **African Monarch** is a common butterfly which is widespread in Asia and Africa. It belongs to the danaine ("Crows and Tigers") subfamily of the brushfooted butterfly family Nymphalidae

Kingdom: Animalia  
Phylum: Arthropoda  
Class: Insecta  
Order: Lepidoptera  
Super family: Papilionoidea  
Family: Nymphalidae  
Subfamily: Danaina  
Genus: *Danaus*  
Species: *Chrysippus*  
Binomial name: *Danaus chrysippus*

#### Referances:

1. Bingham C.T. (1907) Fauna of British India including Ceylon & Burma vol. I Printed by Taylor & Francus (London) (from internet.)
2. Issac Kehimkar, 2008, The Book of Indian Butterflies, Published by Bombay Natural History Society.
3. Krushnamegh Kunte, 2000, Butterflies of Peninsular India, Published by University Press (Indian) Pvt. Ltd.

## Butterfly Diversity of Maharashtra Nature Park

Prahant Gokarnkar, Sachin V. Chorge\* and Anil Rajbhar\*\*

Maharashtra Nature Park, Mahim, Mumbai RKT College, Ulhasanagar, Thane\*  
St. Xavier College, Fort, Mumbai\*\*

**Abstract:** : The species diversity of butterflies of reclaimed land at Mithi river in Maharashtra Nature Park (MNP) in Mumbai ( Latitude 19° 02'N; Longitude 72° 48'E) was studied. The MNP is situated near the Mahim creek where the Mithi river runs into the sea. MNP is developed on erstwhile government dumping ground, by land filling of 15 hectares. Primarily there was marshy mangrove forest but today it is vibrant lush green urban forest. So this is an introduced habitat between the mangroves. The development work was started in 1982-83, many trees were planted and the park was opened for visitors on 22 April 1994. Today this park has more than 14,000 plants, 84 species of birds have been sighted, 40 species of butterflies and many more. This is the first successful trial of making man made habitat in Mumbai. Lycaenidae and Nymphalidae families are in abundance. Some beautiful species like Blue Oak Leaf (*Kallima horsfieldi*) and Blue Mormon (*Papilio polymnestor*) are also noted at the site. The present study comprises of a survey of butterflies of Maharashtra Nature Park (MNP) in Mumbai. During the study period April 2008 to October 2008, total 72 butterfly species belonging to 6 families were observed. This study would provide base line data for planning effective management of insect diversity with respect to development of Maharashtra Nature Park (MNP).

**Keywords:** Maharashtra Nature Park (MNP), Butterfly Biodiversity, Mithi River.

---

### Introduction

Biodiversity is a neologism and portmanteau word, from biology and diversity. (Anathakrishnan 2002) Biodiversity is the variation of life forms within a given ecosystem, biome or for the entire Earth. Biodiversity is often used as a measure of the health of biological systems.

The area under study was garbage dumping land of Mumbai Municipal Corporation. In 1980 it was India's biggest dumping ground. The garbage dumping was then stopped and the area is being developed as "Nature Park". Previously it was known as "Mahim Nature Park" now known as "Maharashtra Nature Park". At present there are more than 14,000 plants of different species. Now it have become a good example of man made forest. By this time MNP have developed insect fauna very special for the region, as the park is surrounded by Dharavi slum from east, west and south side, whereas north side is blocked with Mithi river. So very less chances are there for migration of fauna from forested area to MNP.

Insects are one of the good indicators of environmental quality of any ecosystem.

Butterflies have specific habitat requirement for their feeding and reproduction, loss of which may cause local extinction. Thus the conservation value of a habitat could be assessed by the presence of various species of Butterflies in an area.

### Selection of study area

With its geomorphic head in the city of Mumbai, the

Maharashtra Nature Park is geographically located at Latitude 19° 02'N; Longitude 72° 48'E. It covers 37 acres of area with length 1km and maximum width 200 meter. The municipal corporation previously used it as garbage dumping ground. The total land fill area is more than 40 acres.

Out of 37 acres of area 30 acres of land was selected for observation. Major observations were carried out near afforested area. The denseness of bushes was less in this area. This made the observation clear and easier. As trail areas for visitors are selected and marked by building pavement, overall anthropological activities were less in the most part of area of study.

### Material and Methods

The aim of the study was to produce report of species of butterflies observed over short period and hence random observations were conducted from April 2008 to October 2008. The time of observation was throughout day from morning 8:30 am to evening 5:00 pm.

Observations were made by direct visual methods. For much specification Digital cameras of 3X and 4X optical zoom were used. Cameras used were, Samsung 6.0 mega pixels with 3X optical zoom and digital control; another camera Canon 8.0 mega pixel with 4X optical zoom and digital control. Macro mode of camera was used to get fine pictures. Flash was mostly kept off to capture natural colours.

Standard guides which are available such as Issac Kehimkar (2008), Krushnamegh Kunte(2000), aided identification, classification and nomenclature of butterflies.

## Result and discussion:

During the study 56 species types of butterflies belonging to 6 families were recorded. In general the families Lycaenidae and Nymphalidae had dominant representation. Following is the list of the butterflies. The number of species recorded is more than previous record of 39 butterflies.

List of Butterflies in Maharashtra Nature Park, Mumbai.

Sr. No.	COMMON NAME	SCIENTIFIC NAME
FAMILY - Hesperidae		
1	Chestnut bob	<i>Iambrix salsa</i>
2	Common Banded Awl	<i>Hasora chromus</i>
3	Common Redeye	<i>Matapa aria</i>
4	Conjoined Swift	<i>Pelopidas conjuncta</i>
5	Grass Demon	<i>Udaspes folus</i>
6	Great Swift	<i>Pelopidas assamensis</i>
7	Malabar Spotted Flat	<i>Celaenorrhinus ambareesa</i>
8	Paint Brush Swift	<i>Baoris farri</i>
9	Pale Palm dart	<i>Telicota colon</i>
10	Small Branded Swift	<i>Pelopidas mathias</i>
11	Straight Swift	<i>Parnara guttatus</i>
12	Common Small Flat	<i>Sarangesa dasahara</i>
FAMILY - Lycaenidae		
13	African Babul Blue	<i>Azanus jesous</i>
14	Bright babul Blue	<i>Azanus ubaldus</i>
15	Common Cerulean	<i>Jamides celeno</i>
16	Common Line Blue	<i>Prosotas nora</i>
17	Common pierrot	<i>Castlius rosimon</i>
18	Dark Cerulean	<i>Jamides bochus</i>
19	Dark Grass Blue	<i>Zizeeria karsandra</i>
20	Dingy Lineblue	<i>Petrelaea dana</i>
21	Forget Me Not	<i>Catochrysops strabo</i>
22	Gram blue	<i>Euchrysops cnejus</i>
23	Indian Cupid	<i>Everes lacturnus</i>
24	Indian Sunbeam	<i>Curetis thetis</i>
25	Lime Blue	<i>Chilades lajus</i>
26	Malayan	<i>Megisba malaya thwaitesi</i>
27	Pea Blue	<i>Lampides boeticus</i>
28	Pointed Ciliated Blue	<i>Anthene lycaenina</i>
29	Red Pierrot	<i>Talicauda nyseus</i>
30	Six Line Blue	<i>Nacaduba kurava</i>
31	Zebra Blue	<i>Leptotes plinius</i>
FAMILY - Pieridae		
32	Common Albatross	<i>Appias albina</i>
33	Common Emigrant	<i>Catopsilia pomona</i>
34	Common Grass Yelow	<i>Eurema hecabe</i>
35	Common Gull	<i>Cepora nerissa</i>
36	Common Jezebel	<i>Delias eucharis</i>
37	Common Wanderer	<i>Pareronia valeria</i>

38	Indian Cabbage White	<i>Pieris cantidia</i>
39	Mottled Emigrant	<i>Catopsilia pyranthe</i>
40	Pioneer	<i>Belenois aurota</i>
41	Psyche	<i>Leptosis nina</i>
42	Small Grass Yelow	<i>Eurema brigata</i>
43	Small Salmon Arab	<i>Colotis amata</i>
44	Spot Grass Yellow	<i>Eurema sp.</i>
45	Yellow Orange Tip	<i>Ixias pyrene</i>
FAMILY - Papilionidae		
46	Blue Mormon	<i>Papilio polymnestor</i>
47	Common Mormon	<i>Papilio polytes</i>
48	Lime butterfly	<i>Papilio demoleus</i>
49	Tailed Jay	<i>Graphium agamemnon</i>
FAMILY - Danaidae		
50	Blue Tiger	<i>Tirumala limniace</i>
51	Common Crow	<i>Euploea core</i>
52	Glassy Tiger	<i>Parantica aglea</i>
53	Plain Tiger	<i>Danaus chrysipus</i>
54	Stripped Tiger	<i>Danaus genutia</i>
FAMILY - Nymphalidae		
55	Angled Castor	<i>Ariadne ariadne</i>
56	Baronet	<i>Euthalia nais</i>

\*Data publication and copyrights reserved by Research team and Maharashtra Nature Park, Mahim, Mumbai.

The Maharashtra Nature park region have become a good example of forest within city. This new record will definitely attract butterfly and nature lovers to the MNP and it will become possible to explore more data and more conservation and development strategies will be used to maintain and enhance the fauna and floral diversity of MNP.

## Acknowledgement

Special thanks to Mr. Avinash Kubal, M.Sc. Physics, Dept. Director of Maharashtra Nature Park (Wild Life Conservation) and Mr. Bipin Joshi, Program coordinator, Maharashtra Nature Park.

## References

Books and Papers

1. Issac Kehimkar, 2008, The Book of Indian Butterflies, Bombay Natural History Society.
2. Krushnamegh Kunte, 2000, Butterflies of Peninsular India, University press (Indian) Pvt. Ltd.
3. Official database of Maharashtra Nature Park, Mahim, Mumbai.

Web Sites and Web Pages

1. <http://www.lepbarcoding.org>
2. <http://www.catalogueoflife.org>

## Development of the Butterfly Common Baron *Euthalia aconthea*

Suvarna Rawal and Dayanand Patil

**Abstract:** : Life cycle of common baron *Euthalia aconthea* was studied. The larvae feed voraciously on Mango leaves and camouflage with the leaf background. Pupal stage was also camouflaging green and lasted for 48 hours. Adult was found to hatch early in the morning. It remains motionless for 2-3 hours and then takes to flight.

**Keywords:** : Common baron, Mango leaves, Camouflage

### Introduction:

Survival of fittest is the natural phenomena of all living organisms, where the protection of life is one of the main objectives. Insect females lay their eggs in open natural places by adopting mimicry phenomena. When embryonic development is completed and larvae come out of the eggs, the larvae size, shape and colouring pattern shows mimicry characteristics. In the present work the life cycle of Common Baron Butterfly is studied in natural environment.

### Materials and Methods :

The larvae of Common Baron were observed growing naturally on mango tree. Observations were made regularly and photos were taken on digital camera.

### Observations

Breeding season of this insect is probably monsoon and post monsoon. The butterfly shows complete metamorphosis in the life cycle i.e. the life stages egg, larva, pupa and adult. The eggs could not be observed or collected from nature but the other stages could be observed.

Larval stages of insect were found on leaves of mango tree. The insect larvae were attached on dorsal side central vein of leaf, with the body projections matching the leaf veins. The larvae being green in colour, were perfectly camouflaged. Larval stage of insect is rigorously feeding stage and larvae moved actively from one place to other place.

The pupal stages were also found to be attached on



Larval stage found in last Week of September 2000

dorsal leaf vein on one point, the colour being green to camouflage with the leaf. The Pupal stage lasts for about 48 hours.

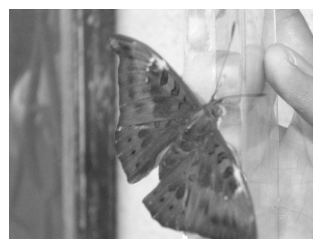
The butterfly comes out from the pupa early in the



morning remains stable for 2-3 hours i.e. it could not fly but walk slowly and then takes to flight.

### The adult

The Butterfly hatches out early in the morning; it hangs from the empty chrysalis. Remains stable 2-3 hours i.e. it could not fly but walk slowly and then take flight.



## Seasonality of Swallowtail Butterfly Community (Lepidoptera: Papilionidae) of Siruvani Forest, Western Ghats, Southern India

Arun, P.R

Green Alternatives, H2/16 Hillside Colony, Vikhroli (W), Mumbai 79.  
e-mail- dr.prarun@gmail.com

**Abstract** : The present paper describes the seasonality in the swallowtail butterfly community of a natural forest of Western Ghats, in Southern India. The population trends of butterflies were monitored for two years using transect counting method as a part of the doctoral research work by the Author (Arun 2000). Of the 19 species of swallowtails found in the Western Ghats, 13 species, including three primarily evergreen species were represented in the mixed deciduous forest of Siruvani. *Papilio polytes* and *Pachliopta hector* were the most common species, while *Graphium nomius* and *Papilio helenus* were the most rare. *Papilio dravidarum*, restricted mostly to the evergreen forests was also present in the area during certain months. The swallowtails were most abundant in the area during the North-east monsoon season with peak abundance recorded during the month of November. Lowest population levels were recorded during the months of April and July. The result shows that the temporal fluctuations in the abundance of Papilionidae corresponded well with that of the overall butterfly community of the area, suggesting that the abundance of swallowtails might as well be considered as an indicator of the general abundance of the butterfly community of the area as well.

**Keywords:** Papilionidae, seasonality, Western Ghats, Transect count, indicator species

---

### Introduction

Seasonal patterns in abundance is an important aspect of the butterfly ecology with major conservation implications. The temporal patterns in the Swallowtail communities are controlled by various ecological determinants and are known for their value as an important ecological indicator group.

The Western Ghats mountain range is one of the two biodiversity hotspots represented in India and represent around a quarter of India's butterfly diversity. The southern part of this mountain range wherein the present study was conducted is known for its high alpha diversity of butterflies (Gaonkar 1996). Unlike other components of the insect community of this mountain, the butterflies are well documented from this mountain range (Gaonkar 1996) especially from the southern parts such as the Nilgiris ((Wynter-Blyth 1944; Larsen 1987b; Larsen 1987c; Larsen 1987d; Larsen 1988; Mathew 1996; Arun 2000). Checklists of butterflies are also available from many areas. However most of these studies were restricted in time and were practically species inventory surveys of different areas. Only a few studies (Arun 2003) have attempted the temporal aspects of butterfly assemblages from Western Ghats (Kunte 1997). The present paper describes the Swallowtail butterfly community of the Siruvani Forests of the Western Ghats.

Swallowtails are true butterflies belonging to the family Papilionidae. Most of them have a tail like backward extension of the hind wings, which has earned them their common name- swallowtails-. These are an important group of butterflies, well known for their conspicuously large sizes and aesthetic value, which has made them the most coveted and highly sought-after butterflies for the butterfly collectors

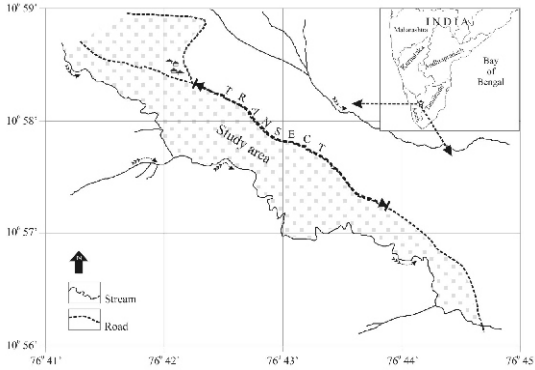
around the world. Many of them including the Southern birdwing (*Troides minos* Cramer) of Western Ghats are listed in the CITES Appendices (Convention On International Trade In Endangered Species Of Wild Fauna And Flora) and are of high conservation priority. The Papilionid butterflies of the area are also characterised by their high degree of endemism compared to other groups of butterflies. Of the total 330 butterflies reported from the Western Ghats only 20% are endemics (to the region of Peninsular India and Srilanka), while it is 42% in Papilionidae (Gaonkar 1996). Of the two sub families and 107 species of swallowtails present in India, only one subfamily and 19 species are represented in the Western Ghats (Larsen 1987a). Out of this five species are exclusively endemic to the Peninsular India and other three species are shared endemics of Peninsular India and Srilanka. The present paper describes the status, seasonality and conservation importance of the swallowtail butterflies of the moist deciduous forest of Siruvani in the southern Western Ghats of India based on a two-year study from 1994-1996.

### Study area

The moist deciduous forests of Siruvani falling between 10o 56' - 58' N and 76o 41' - 45' E in the Boluvampatti Reserve Forest located in the foothills of Western Ghats about 35 km west of Coimbatore, Tamil Nadu, South India was the selected study area. The area receives good rainfall during both the North-East and South-West Monsoons. The mean annual rainfall of the area during the study period was 2092mm, much higher than that generally received by Moist deciduous zones (Champion and Seth 1968), owing to the closeness of the study area to one of the core zone evergreen forests of the Nilgiri Biosphere Reserve.



The transect selected for the study was about four kilometre off the forest check post at Sadivayal on the road towards the Water Filtering plant of TWAD (Tamilnadu Water Supply and Drainage) Board. The transect route of one kilometre was selected representing all the available habitats in the area (Figure 1).



**Figure 1** Map of the study area showing the Location of the Butterfly transect

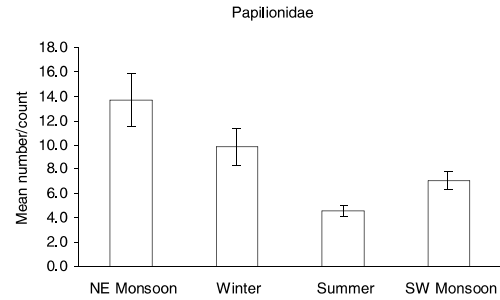
**Materials and Methods**

The standard transect counting method was used for monitoring the butterfly population of the study area. The butterflies encountered along a fixed transect route of 1 km was recorded regularly at an interval of 10 days for a two year period from September 1994 to August 1996. All the butterflies recorded at a distance of 5m from the observer were recorded during the counts. All the counts were done on non-rainy days during morning hours between 9.30 to 10.30 AM during which the butterfly activity was maximum (Arun 2003). For the purpose of the present study, four major seasons were identified namely, South-west monsoon (Jun to August), North-east monsoon (September to November), Winter (December to February) and Summer (March to May).

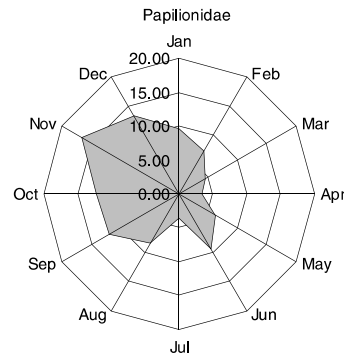
Continuous downpour with short sunny intervals (during which the monsoon counts were done) was characteristic of both the monsoon seasons. Since the butterflies had to probably utilize the available short periods for foraging, a slight overestimation of the abundance figures is likely during the Monsoon counts. However, all possible efforts were taken for an unbiased estimation all through the year using the same transect route and timings. In order to avoid any personal difference all the counts were made by the same person (Author).

**Results and Discussion**

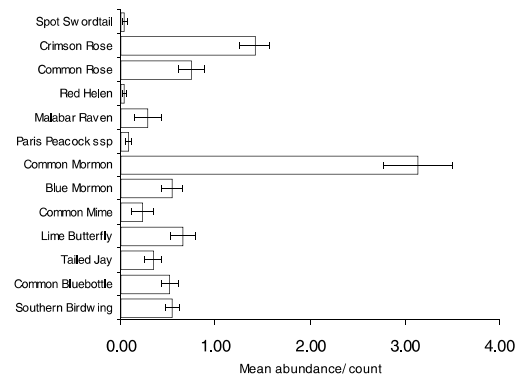
Swallowtails were the third most abundant butterfly family in the area after Pieridae and Nymphalidae (Arun 2000; Arun 2003) which represented about 14% of the total individuals and 10% of the total species of butterflies recorded during the study. The abundance of Swallowtail



**Figure 2** Seasonal abundance of Papilionidae



**Figure 3** Radar plot showing the monthly fluctuations in the abundance of Swallowtails



**Figure 4** Mean abundance of thirteen Swallowtails present in Siruvani

butterflies recorded varied among counts (0-19) with an overall mean of 8.58 (± 6.69) individuals per count.

Swallowtail butterflies were most abundant in the area during the Northeast monsoon (Table 3) and least abundant during the summer season (Figure 2). Monthly variation in the abundance showed that the swallowtails were most abundant in the area during the four-month period of September to December with a prominent peak in abundance in November (Figure 3). All through this period the mean abundance exceeded 10 individuals per count. The abundance

Table 1 Seasonality of Swallowtail butterflies of Siruvani forest

No	Common Name	Scientific name	Months *
1	Tailed Jay	<i>Graphium agammemnon</i>	Except Jan, Jul and Oct
2	Spot Sword tail	<i>Graphium nomius</i>	Apr
3	Common Bluebottle	<i>Graphium sarpedon</i>	Except Jan
4	Common Rose	<i>Pachliopta aristolochiae</i>	Except April and Jun
5	Crimson Rose <sup>+</sup>	<i>Pachliopta hector</i>	All months
6	Common Mime	<i>Papilio clytia</i>	Feb, Apr- June, Sep and Oct
7	Lime Butterfly	<i>Papilio demoleus</i>	Except Jan and Nov
8	Malabar Raven <sup>+</sup>	<i>Papilio dravidarum</i>	Jan, Oct and Nov
9	Red Helen	<i>Papilio helenus</i>	Oct- Nov
10	Paris Peacock	<i>Papilio paris</i>	June and Oct- Dec
11	Blue Mormon	<i>Papilio polymnestor</i>	Except Jun and Jul
12	Common Mormon	<i>Papilio polytes</i>	All months
13	Southern Birdwing <sup>+</sup>	<i>Troides minos</i>	Except Mar
* Months in which the species was encountered during the transect counts			
+ Species endemic to the region of South India and Sri Lanka			

Table 2 Swallowtail butterflies of Southern India and their ecological distribution

<b>Papilioninae: Troidinii</b>				
1	<i>Troides minos</i> Cramer	C	WG/PI	EG
2	<i>Pachliopta pandiyana</i> Moore	R	WG/PI	EG
3	<i>Pachliopta aristolochiae</i> Fabr.	C	-	MD, SC, AG
4	<i>Pachliopta hector</i> Linn.	C	WG/PI, SL	MD, SC, AG
<b>Papilioninae: Leptocircini</b>				
5	<i>Graphium sarpedon</i> Lin	C	-	Generalist
6	<i>Graphium doson</i>	C	-	EG
7	<i>Graphium agammemnon</i> Lin.	C	-	EG, MD, AG
8	<i>Graphium nomius</i> Esper	C	-	MD
9	<i>Graphium antiphates</i>	C	-	EG
<b>Papilioninae: Papilionini</b>				
10	<i>Chilasa clytia</i> Lin.	C	-	EG, MD
11	<i>Papilio demoleus</i> Lin	C	-	Generalist (except EG)
12	<i>Papilio liomedon</i>	R	WG/PI	EG
13	<i>Papilio dravidarum</i> Wood	R	WG/PI	EG
14	<i>Papilio helenus</i> Lin.	C	-	Generalist
15	<i>Papilio polytes</i> Cramer	C	-	Generalist (except EG)
16	<i>Papilio polymnestor</i> Cramer	C	WG/PI, SL	Generalist
17	<i>Papilio paris</i>	C	-	EG
18	<i>Papilio budha</i>	R	WG/PI	EG
19	<i>Papilio crino</i>	R	WG/PI, SL	MD
* WG Western Ghats, PI Peninsular India, SL Srilanka				
** EG- Evergreen, MD Moist/Mixed deciduous, AG Agriculture lands				
Source: Larsen 1987, Gaonkar 1996				

Table 3 Seasonal abundance of Swallowtails (Number per count)

	SEASON							
	NE Monsoon		Winter		Summer		SW Monsoon	
	Mean	Std Deviation	Mean	Std Deviation	Mean	Std Deviation	Mean	Std Deviation
Southern Birdwing	1.06	.90	.62	.67	.14	.36	.45	.51
Common Bluebottle	.88	.86	.29	.56	.29	.46	.70	.98
Tailed Jay	.65	1.22	.33	.73	.19	.40	.25	.44
Lime Butterfly	.53	.80	.48	.87	.67	.80	.95	1.96
Common Mme	.65	1.97	.10	.44	.19	.51	.05	.22
Blue Mormon	1.24	1.44	.52	.87	.33	.48	.20	.41
Common Mormon	4.82	4.50	3.71	3.86	1.43	1.12	2.90	1.97
Paris Peacock ssp	.24	.56	.05	.22	.00	.00	.05	.22
Malabar Raven	1.18	2.43	.14	.48	.00	.00	.00	.00
Red Helen	.18	.39	.00	.00	.00	.00	.00	.00
Common Rose	.47	.62	1.67	1.85	.14	.36	.65	.81
Crimson Rose	1.76	1.68	1.95	1.75	1.10	1.00	.90	.79
Spot Swordtail	.00	.00	.00	.00	.14	.48	.00	.00

was very low during the months of April and July, during which the mean encounter rate of swallowtails dropped to less than five per count.

Of the 19 species of swallowtail butterflies present in the Western Ghats 13 were recorded from Siruvani during the present study (Table 1). Common mormon (*Papilio polytes*) was the most abundant species and Spot sword tail (*Graphium nomius*) the least (Figure 4). A comparison of fluctuations in the abundance of swallowtail butterflies with that of the total butterflies (all families together) showed a similar pattern (Figure 5) with significant correlation in between (Figure 6;  $R = 0.623$ ,  $P < 0.001$ ,  $N = 79$ ). This is suggestive of the indicator value of swallowtail population to reflect the changes in the overall butterfly population of an area. However, further studies need to be undertaken in other areas and habitats to corroborate this finding.

The Malabar Raven (*Papilio dravidarum*) was present in the study area in good numbers during October-November months. Since *P. dravidarum* is reported to be a species strictly limited to the lowland evergreen forests (Table 2), presence of this species in the study area is of ecological significance and need to be further investigated to confirm whether the species is resident in the mixed deciduous forests as well. Further, the population status and habitat preference of swallowtails of Nilgiri biosphere need to be studied to facilitate appropriate management strategies and conservation priorities.

### Acknowledgements

The study formed a part of my Ph.D research and was conducted along with a major ecological study entitled "Breeding Strategies of Birds in a moist deciduous Forest of Siruvani". I acknowledge the financial aid received from the Ministry of Environment and forests, Govt. of India through Sálím Ali Centre for Ornithology and Natural History (SACON). I am highly indebted to Dr. VS Vijayan, Director,

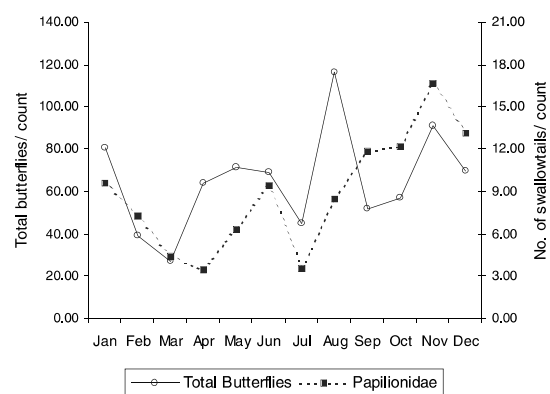


Figure 5 Seasonal abundance pattern of Overall butterfly community and the swallowtails

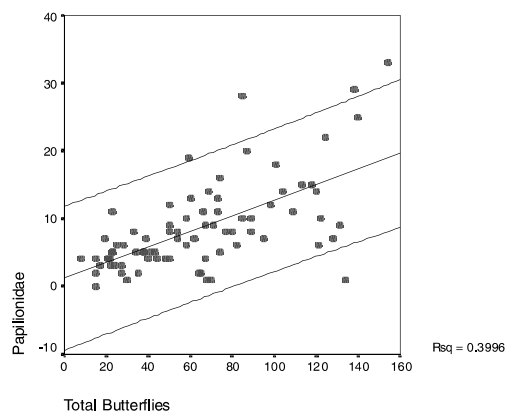


Figure 6 Scatter plot depicting the relationship between the abundance of overall butterfly community and the swallowtails (Upper and lower lines indicate 95% confidence interval)

SACON and Dr. PA Azeez, Head, Environmental Impact Assessment Division, SACON for their constant support, encouragement and constructive suggestions throughout. I acknowledge the help of my field assistants Mr. Palani and Manoharan. The Staff members of Tamilnadu Forest Department, Tamilnadu Water supply And Drainage Board (TWAD) and Coimbatore Municipal Corporation (CMC) at Siruvani are also acknowledged for their help and cooperation during the fieldwork.

#### References:

Aitken, E. H. and Comber, E. (1903). A list of the butterflies of Konkan. *Journal of the Bombay Natural History Society* 15, 42-55.

Arun, P. R. (2000) Seasonality and abundance of insects with special reference to butterflies (Lepidoptera: Rhopalocera) in a Moist deciduous forest of Siruvani, Nilgiri Biosphere Reserve, South India. *Ph. D Thesis, Bharathiar University, Coimbatore.* 236

Arun, P. R. (2003). Butterflies of Siruvani Forests of Western Ghats, with notes on their Seasonality. *Zoos' Print Journal* 18, 1003-1006.

Arun, P. R. and Azeez, P. A. (2003). On the butterflies of Puyankutty forests, Kerala, India. *Zoos' Print Journal* 18, 1276-1279.

Asaithambi, P. (1994). Butterflies of Mudumalai Wildlife Sanctuary, Tamil Nadu. *Zoos Print* 9, 1.

Champion, H. G. and Seth, S. K. (1968). A revised survey of the forest types of India. 404.

Dingle, H., Zalucki, M. P. and Rochester, W. A. (1999) Season-specific directional movement in migratory Australian butterflies. *Australian Journal of Entomology.* 38; 323-329

Fergusson, H. S. (1891). A list of the Butterflies of Travancore. *Journal of the Bombay Natural History Society* 6, 438-448.

Fleishman, E. and MacNally, R. (2002) Topographic determinants of faunal nestedness in Great Basin butterfly assemblages: Applications to conservation planning. *Conservation Biology.* 16 (2); 422-429

Fleishman, E., Nally, R. M. and Fay, J. P. (2003) Validation tests of predictive models of butterfly occurrence based on environmental variables. *Conservation Biology.* 17 (3); 806-817

Forister, M. L. and Shapiro, A. M. (2003) Wing pattern variation in the Anise swallowtail, *Papilio zelicaon* (Lepidoptera : Papilionidae). *Ann. Entomol. Soc. Amer.* 96 (1); 73-80

Gaonkar, H. (1996) Butterflies of the Western Ghats, Including Sri Lanka: A biodiversity assessment of a threatened

mountain system. -86

Gunathilagaraj, M., Kumar, G., and Ramesh, P. T. (1997). Butterflies of Coimbatore. *Zoos Print* 12, 26-27.

Hazel, W. N. (2002) The environmental and genetic control of seasonal polyphenism in larval color and its adaptive significance in a swallowtail butterfly. *Evolution.* 56 (2); 342-348

Ishii, M. (1993). Transect count of butterflies. *In Decline and conservation of butterflies in Japan, II* 91-101.

Keyghobadi, N., Roland, J. and Strobeck, C. (1999) Influence of landscape on the population genetic structure of the alpine butterfly *Parnassius smintheus* (Papilionidae). *Mol. Ecol.* 8 (9); 1481-1495

Khatri, T. C. (1991). A checklist of butterflies (Rhopalocera: Lepidoptera) from Penninsular India. *Journal of Andaman Science Association* 7, 63-74.

Kunte, K. J. (1997). Seasonal patterns in butterfly abundance and species diversity in four tropical habitats in Northern Western Ghats. *Journal of Biosciences* 22, 593-603.

Larsen, T. B. (1987a). Swallowtail communities in Southern India. *Papilio International* 4, 275-294.

Larsen, T. B. (1987b). The Butterflies of Nilgiri mountains of Southern India (Lepidoptera: Rhopalocera): Part I. *Journal of the Bombay Natural History Society* 84, 26-54.

Larsen, T. B. (1987c). The Butterflies of Nilgiri mountains of Southern India (Lepidoptera: Rhopalocera): Part II. *Journal of the Bombay Natural History Society* 84, 291-316.

Larsen, T. B. (1987d). The Butterflies of Nilgiri mountains of Southern India (Lepidoptera: Rhopalocera): Part III. *Journal of the Bombay Natural History Society* 84, 560-584.

Larsen, T. B. (1988). The Butterflies of Nilgiri mountains of Southern India (Lepidoptera: Rhopalocera) Part IV. *Journal of the Bombay Natural History Society* 85, 26-43.

Leps, J. and Spitzer, K. (1990). Ecological determinants of butterfly communities (Lepidoptera, Papilionidae) in the Tam Dao Mountains, Vietnam. *Acta Entomol. Bohemoslov* 87, 182-194.

Lien, V. V. and Yuan, D. C. (2003) The differences of butterfly (Lepidoptera, Papilionoidea) communities in habitats with various degrees of disturbance and altitudes in tropical forests of Vietnam. *Biodiversity Conservation.* 12 (6); 1099-1111

Mathew, G. (1991). Butterflies of Silent Valley. *Evergreen, Newsletter of KFRI* 26, 1-3.

Mathew, G. (1996). Insect diversity in the Nilgiri Biosphere Reserve- An overview. *Zoos Print* 11, 11-13.

Natuhara, Y., Imai, C., Ishii, M., Sakuratani, Y., and Tanaka, S. (1996). Reliability of transect count method for monitoring butterfly communities: 1. Repeated counts in an urban park. *Japanese Journal of Environmental Entomology and Zoology* **8**, 13-22.

Pollard, E. (1977). A method for assessing changes in the abundance of butterflies. *Biological Conservation* **12**, 115-131.

Pollard, E. and Yates, T. J. (1993). Monitoring butterflies for Ecology and Conservation. 274.

Rathinasabapathy, B., Daniel, B. A., and Mathew, G. (1998). Butterflies of Coimbatore Zoological Park site, Anaikatty. *Zoos Print* 25.

Spitzer, K. (1983). Seasonality of the butterfly fauna of Southern Vietnam (Papilionidae). *Journal of Research on Lepidoptera* **22**, 126-130.

Spitzer, K., Novotny, V., Tonner, M., and Leps, J. (1993). Habitat preferences, distribution and seasonality of the butterflies (Lepidoptera, Papilionidae) in a montane tropical rain forest, Vietnam. *Journal of Biogeography* **20**, 109-121.

Swengel, S. R. and Swengel, A. B. (1999) Correlations in abundance of grassland songbirds and prairie butterflies. *Biological Conservation*. **90** (1); 1-11

Wynter-Blyth, M. A. (1944). Butterflies of the Nilgiris. *Journal of the Bombay Natural History Society* **44**, 536-549.

## Some Aspects of Biology of Grass Demon Skipper

Kamlakar V. Indulkar and Purshottam G. Kale

Department of Biological Science, R.J. College, Ghatkopar, Mumbai- 400078.

Kamlakar\_2020@yahoo.com; pgkale@gmail.com

**ABSTRACT** : *Udaspes folus* (Cramer), the 'Grass Demon' skipper, is a common skipper in India. It has been found on ginger lily, wild lily, ginger, turmeric and mango ginger. Slight changes are observed in larval conditions of the species collected from different food plants. Mostly, for the present study, the larvae and eggs of grass demon were collected from ginger lily. Female lays isolated eggs on the upper surface of the leaf. After hatching out of egg shells, the larva feeds on the host plant and within 22-23 days develops into adult. The growth of the larva was found to be in the proportion to the food consumed. The amount of excreta was found to depend on the amount of food consumed. A parasitic wasp was observed growing in the body of some larvae. The larvae of the wasp were found to emerge from the body of larva of skipper by making pores all over the body and formed pupae immediately. Within four days, the wasps were found to emerge from the pupae.

**Keywords** : Grass Demon skipper, Biology.

---

### Introduction :

The grass demon skipper is classified as follows:

Kingdom : Animalia

Phylum : Arthropoda

Class: Insecta

Superfamily: Hesperioidea

Family : HesperIIDae

Genus : *Udaspes*

Species : *folus*

Skippers are generally distinguished from the butterflies by the stoutness of their body in comparison to their relatively small angular wings and the thin extension or hook, called apiculus, at the end of the club shaped antenna. The rapid bounding flight of these butterflies has given them their name 'skipper'. All together, 3500 species of skippers occur throughout the world. Of them, India has 321 species. The skippers are of two types, one type hold their wings open and flat when settled and the others usually have their wings completely closed or with their hind wings more or less completely open but forewings only partially open. Several species have an exceptionally long proboscis that makes their access to nectarines of tubular flowers a lot easier.

Grass demon is found in India (South India up to South Gujarat, Madhya Pradesh, Uttar Pradesh, Himachal Pradesh to North-east and from Kangra, eastwards including West Bengal), Nepal, Bhutan, Bangladesh, Myanmar, Shrilanka, South east Asia and Australia. Adults are seen during February to March and May to October.

Kunte (2000) has reported that in appearance grass

demon is an unmistakable butterfly due to its black and white colouration. However, its habits are similar to the other peninsular Indian Demons, the Restricted Demons and the Common Banded Demon.

### Objectives

The present study on Grass Demon was done keeping following objectives in mind.

To investigate the host plant preference by the Grass Demon skipper.

To study the egg laying habit of Green Demon Skipper.

To monitor stages in the life cycle of *Udaspes folus*, the Grass Demon skipper.

To study the food consumption pattern of the larva of Grass Demon.

To monitor metamorphosis of the larva of Grass Demon.

### Material and Methods

Eggs were collected from field → Hatched under laboratory conditions (temp.27C, moisture 95%) → Larvae were fed on pre-weighed fresh leaves → The unconsumed part was weighed and discarded before presenting the fresh food → The excreta was collected and weighed → Length and weight of the larva was noted every day at 9.00am. → The morphological changes were carefully noted → After pupation, the pupae were maintained at the same conditions and their length as well as weight was noted every day. → Hatching of the pupae was monitored ! The period taken by the adult to start flight and the changes during this period were noted. → The adults were maintained with and without food (minced fruits sugar syrup and fresh flowered of food

plants) to determine their life span.

### Observations and Results

Table showing food consumption and growth of grass demon.

DAY	FEEDING OF LARVA		GAIN IN LARVA		OBSERVATION
	LEAVES	FOOD	WEIGHT	LENGTH	
	CONSUMED	INCORPORATED	mg	mm	
	mg	Mg			
0	-	-	6	2	
1	240	230	4	6	
2	340	330	20	6	
3	360	350	20	7	
4	400	380	20	2	Moulting
5	590	570	40	4	
6	440	410	30	4	
7	440	430	10	2	Moulting
8	330	310	10	2	
9	360	340	60	3	
10	830	780	60	3	Moulting
11	830	740	160	3	
12	760	660	110	3	
13	1110	880	160	5	
14	770	560	-10	0	
15	1220	1030	-60	0	Pupa
16	-	-	-90	-8	
17	-	-	-10	-	
18	-	-	-10	-	
19	-	-	-10	-	
20	-	-	-10	-	
21	-	-	-20	-	
22	-	-	-	-	Adult emerge

During the present study, the larvae were mainly collected from Ginger lily though they were also found on the leaves of wild lily. Once, the larvae were observed on the leaves of turmeric plant as well. According to Kehimker (2007), the larva of Grass Demon also found on *Curcum aromatica*, *C. decipieris*, *C. pseudonata*, *Hedychium spp.* *Zingiber spp.* and other plants related to ginger and turmeric i.e. plants belongs to family Zingiberaceae. When the larvae found on wild lily were fed on the leaves of the members of Zingiberaceae plants, they soon stopped feeding, became dark in colour and died within 3 to 4 days.

The sexes of grass demon have a similar appearance (no sexual dimorphism is observed). The females were found to spend some time around the food plant of the larvae, apparently to survey the available resources and potential sites for laying eggs. Eventually, a female would sit on the upper surface of the leaf, bend only tip of the abdomen, deposit usually a lone egg, though a female would lay two or three eggs at a time and immediately would take off. The egg is reddish brown when fresh turning whitish with a red

top later. The egg is superficially smooth, dome shaped and around 1mm in diameter.

After hatching, the caterpillar does not completely consume the egg shell. The young larva is found to be sluggish and to feed only at night, early morning and late evening hours. The caterpillar is with a uniform, light leaf-green colour with a dark green pulsating line on the back and an unmarked black head. The head is small compared to the body and always lies closely applied to the leaf. The larva was seen to have a peculiar habit of turning over a triangular piece from the edge on the upper surface of the leaf over the body and remains hidden within the fold. The segment number 2 and 3 are yellowish and last segment is whitish, with 2 white dots at two thirds distance from the anterior side. Ventrally there are white patches between the legs (refer to the images).

A few hours before the caterpillar moults, its head looks pinkish white and turns black only after moulting and drying of the new exoskeleton is complete. The exoskeleton is thin and semitransparent. Through it the white tracheal tubes are visible. Caterpillar rolls the leaves into shelter and also feed on them.

The length of larva increases from initial 4 mm to the final 43 mm. Initially, it weighs around 10mg and as the larva consumes leaf material voraciously, the weight increases steadily. At the beginning it consumes around 300 mg – 390 mg of fresh leaves per day and the consumption gradually increasing to 830 mg to 1220 mg as the length and weight of larva increases. A dramatic increase in the feeding efficiency was noted between 10 and 13 days after hatching of the larva, when the weight gain was also high. Just prior to pupation, between 14th and 16th day after hatching, the amount of the leaf material consumed was remarkably more but the amount of excreta was much lesser. However there was no weight gain. On the contrary, there was some loss in weight on the last day of the larva prior to pupation. This may be due to a stepped up metabolic rate.

The pupa steadily lost weight from day 16th to day 22nd as the food reserves get consumed in metamorphosis and emergence of the adult. Through the translucent wall of the pupa, the eyes of the skipper become visible first; later the wings become visible. Initially they appear white and darken gradually. The dark colored wings are visible in the later stages of metamorphosis.

It has also been observed that while on the food plant in nature, the larva feeds and egests the wet excreta. However, under the laboratory conditions, after consuming leaves, the larvae egested dry solid excreta, low in water content. The amount of egested excreta increases from less than 10 mg to 210 mg, as the size and consumption of food of the larva increases.

Pupation takes place on the same plant often on the same

leaf on which the caterpillar last fed. After about 16 days the larva gets converted into pupa. When the larva pupates, its length decreases from 43 mm to 35 mm and there is a corresponding decrease in weight from 660 mg to 570 mg. The pupa is long and cylindrical, with a longish, conical, pointed projection in front of the head. The weight of the pupa decreases daily by about 10 mg to 30 mg. On the fourth day, five black dots appear on the dorsal side of pupa and red eye spots become distinct.

The most striking characteristic of the pupa is its proboscis, which is very long, extending beyond the wing cases after which it is detached from the main body of the pupa, stretching slightly longer than tip of the abdomen. The pupa is of the same colour as the caterpillar. It is enveloped in a thin sparse layer of white powdery material. Around the 22<sup>nd</sup> or 23<sup>rd</sup> day, the butterfly emerges from the pupa. Some pupae, which are usually brown in colour, remain dormant. They might, in nature be hatching into adults, though under laboratory conditions they were found to perish.

In some larvae of grass demon, after they had attained the length of about 30mm some other larvae were observed in their bodies and could be seen through their transparent exoskeleton. The weight of such larvae was found to decrease by 50 mg per day. After 5 days of noting the larvae inside, the body of these skipper larvae developed pores and wasp larvae emerged. Immediately after emerging, they formed white pupae and the adult wasps emerged from them within next four days.

Identification of the wasp and how and when it lays eggs in the body of the larva remains to be studied.

**Reference :**

Aseem Srivastava, 'Butterflies a Photographic Compendium of Butterflies of Central India', Tripathaga Prakashan Pvt. Ltd, Haidrabad.

B.M. Parasanarya and J.J. Jani, 'Butterflies of Gujrat', Anand Agricultural University, Gujarat, First Edition, 2007.

C.P.Friedlander, 'The Biology of Insects', Hutchison of London, 1976.

H.D.Peile, 'A Guide to Collecting Butterflies of India', Staples Press, London,1937.

Issac Kehimker, 'The Book of Indian Butterflies', BNHS, 2007.

Josef Moucha, 'Acolour guide to butterflies', Octopus books, First Edition,1974.

K. Gunathilagraj, 'Some South Indian butterflies', Nilgiri Wild life and Environment Association, First Edition, Aug. 1998.

Kunte Krushnamegh, Ed. Madhav Gadgil, 'India- A Lifescape Butterflies of peninsular India', Universities press Ltd. 2000.

M.A.Wynter, Blyth, 'Butterflies of the Indian region', Today and Tomorrow Printers and Publishers

Sharman Apt Russell, 'An Obsession with Butterflies', Perepus Publishing.

S.W.Frosct, 'Insect life and Insect Natural History', Dover Publication, INC, New York, 1959.



**Larva of the skipper**



**Early pupa**



**Dorsal view of early pupa**

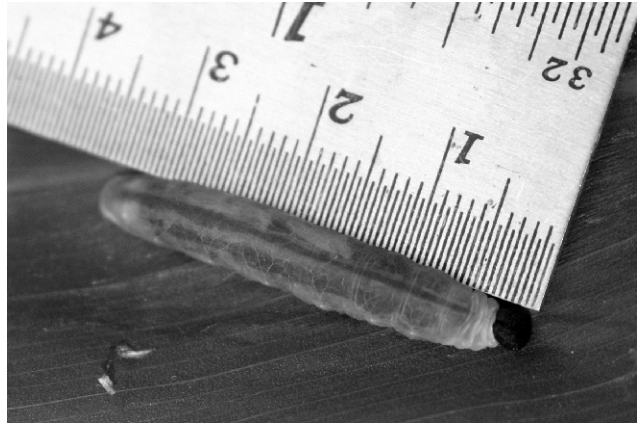


**Pupa ready to hatch**

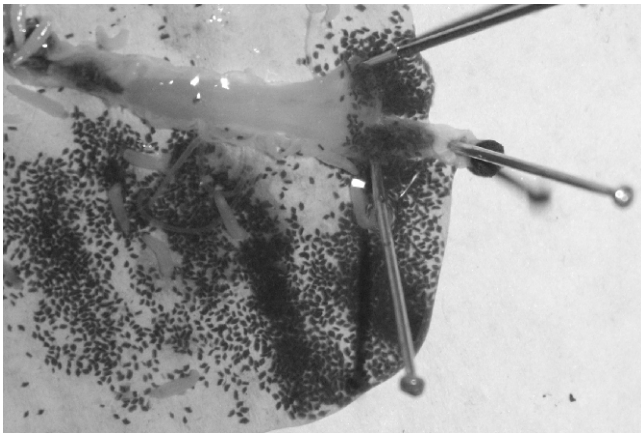




**Adult skipper**



**Larva showing the larvae of wasp Inside the body**



**Dissected larva of skipper showing parasitic larvae of wasp**



**Caracas of the skipper larva with the pupae of wasp**



**Isolated pupa of the wasp**

## Scarabaeid Beetles in and Around Kolhapur City, Maharashtra.

A. B. Mamlayya<sup>1</sup>, S. R. Aland<sup>2</sup>, Y. J. Koli<sup>3</sup>, S. M. Gaikwad<sup>4</sup>,  
D. L. Bharmal<sup>5</sup> & G. P. Bhawane<sup>6</sup>

1, 2, 3 & 6 Department of Zoology, Shivaji University, Kolhapur.

4 Department of Zoology, Bhogawati Mahavidyalaya, Bhogawati.

5 S. P. K. Mahavidyalaya, Sawantwadi

**Abstract:** Scarabaeid diversity and abundance was studied in Kolhapur during March to Oct. 2008. The study on the Scarabaeid fauna from this area resulted in to presence of 33 species of beetles belonging to 22 genera scattered over six subfamilies. The study indicates that the abundance of beetles is depending on the topological factors i.e. on rainfall, type of soil etc. The emergence and abundance of beetles was observed after the first shower of monsoon. *Holotrichia fissa*, *H. serrata*, *H. carci*, *Lecopholis lepidophora*, *Anomala bengalensis*, *Adoretus indicus.*, *Maladara sp.* *Rhinyptia indica*, *Prodoxetus sp.* were found in great numbers during month Jun and July. *Chiloloba orientalis*, and *Anatona stillata* were found plentiful on the ear heads of Jawar and on the grass panicles. *Anthracophora crucifera* found on the Bajara ear heads and fruits of okra. *Xylotrupes giedon* and *Oryctes rhinoceros* were also encountered during the study. *Oxycetonia versicolor* collected on the bajara and jawar ear heads. Observations on the coprophagus beetles specify the presence of 14 species of dung beetles viz. *Catharsius molossus*, *Catharsius biramensis*, *Chironitis arrowi*, *Helicorhis bucephalus*, *Helicorhis tyrannus*, *Liatongus rhadamistus*, *Onitis philemon*, *Synapsis gilleti*, *Onthophagus catta*, *O.nasalis*, *O.aciticollis*, *O.unifasciatus*, *O. cervus*, *O.agnus*.

**Keywords :** Scarabaeid beetles, Kolhapur, Diversity

### Introduction:

The scarabaeid beetles of order Coleoptera include both beneficial and destructive insects. Many of them are polyphagous in nature as both the adults and developing stages feed on the crops, plantations and forests. They serve as pests of agricultural and forest plants. The coprophagus beetles are usually referred as dung beetles. The coprophagus beetle plays a significant role in enriching the forest habitat. Thus the dung beetles occupy a most important link in the conversion and recycling of energy resources in terrestrial ecosystem. (Biswas and Chatterjee, 1986).

The scarabaeidae is the largest family of insects in order Coleoptera which includes 2500 genera species 2000 genera through out the world. About 1,590 species under 203 genera are known from India. (Arrow, 1937, Anonymous, 1991, Balthasar, 1963,1964,

Shenkling, 1921, Young, 1989). The detailed study of scarabaeid beetles has been made in the various regions of the country. Kailash Chandra (2000) studied the diversity of scarabaeid beetles in Madhya Pradesh and reported presence of 94 species under 30 genera distributed over nine families. Newton and Malcolm (1985) studied the coprophagus beetles of Kanha Tiger Reserve. They reported 22 species of dung beetle from Kanha Tiger Reserve. Jitender et al described the Scarabaeid fauna of Kullu valley in Himachal Pradesh. They have given the species composition, relative abundance and periodic activity of scarabaeid beetles in Kullu valley.

White grub beetles are having wide range of host plants. White grub beetles defoliate the agricultural crops, plants of the silvicultural practices and forests. (Chandla *et al.*, 1988, Misra, 1992, Kumar et al, 2005.). In the present investigation the efforts were made to study the scarabaeid diversity from Kolhapur and adjoining areas. In the first effort, the scarabaeid beetles were collected from different regions of Kolhapur which revealed the presence of 33 species of scarabaeid beetles under 22 genera distributed over six subfamilies. Of these, the observation on the life history, seasonal abundance of some scarabaeid beetles in under investigation.

### Material and Methods:

The light trap studies were undertaken at two localities in Kolhapur in and around Kolhapur from March to Oct 2008. The light trap studies were started at last week of March till end of Oct. The collection of beetles was carried out fortnightly. The light trap study in these sites reveals presence of both the phytophagus and coprophagus beetles of scarabaeidae.

For the comprehensive study of dung beetles in grazing fields were selected from these two localities. On average 20 dung pads were selected randomly for sampling. Collected beetles were brought to the laboratory. Beetles were killed, separated, counted species wise and preserved. The beetles were identified with help of available literature. (Arrow, 1931).

## Results and discussion:

The diversity study on the Scarabaeid beetles from the Kolhapur region revealed the presence 33 species of beetles under 22 genera distributed over six subfamilies. The adults of white grub beetles are commonly known as Chafers, May beetles, June beetles all over the world. Among these *Holotrichia fissa*, *H. serrata*, *H. carci*, *Leucopholis lepidophora*, *Maladera sp. (dark brown)*, *Maladera sp. (light brown)*, *Brahmina sp.* were often collected on the different agricultural crops, Neem, Babul, Country almond, Jamun and in the Sugarcane field from this region. The *Anomala bengalensis* and *Adoretus sp.* of Rutelinae are found on the tees like, Country almond, Jamun, Ber. *Rhinyptia indica* and *Prdoretus sp* feed on leaves, flowers, or flower parts. *Chiloloba orientalis* and *Anatona stillata* of Cetoniinae were found to be more abundant on jawar ear heads and grass panicles. At a single sampling of these beetles on an average 100 beetles were collected each during the collection. The coconut beetle, *Oryctes rhinoceros* and *Xylotrupes giedon* were also found during the study.

The survey regarding the coprophagus beetles revealed the presence of 14 species which are found abundantly in the grazing field of the study region. They are *Onthophagus unifasciatus*, *Onthophagus catta*, *Onthophagus nasalis*, *Onthophagus acuticollis*, *Onthophagus agnus*, *Onthophagus cervus*, *Catharsius molossus*, *Catharsius biramensis*, *Helicorpius tyranus*, *Synopsis gilleti*, *Helicorpius sp.*, *Onitis philemon*, *Chironitis arrowi*, and *Liatongus rhadamistus*. During the sampling the *Aphodius sp.* are found in great numbers. But the dug beetles collected from these sites during the study period is very less. It is because of compact soil from these sites which prevent the nidification of beetles. Previously it is proved that the shallow soil contain reduced scarabaeid fauna. (Halfer, 1991). From the studies on the scarabaeid fauna of Kolhapur it has become more clear that the abundance of scarabaeid beetles is related to the rainfall. The abundance of scarabaeid beetles is higher during rainfall especially in monsoon rain. Similar relationships on the occurrence of dung beetles were recorded by Mathews (1972), Tyndale-Biscoe et al. (1981).

## References:

Anonymous, (1991) Animal Resources of India Protozoa to Mammalia, State of Art, ed. Director, Zoological Survey of India, Calcutta, 694 pp.

Arrow, G.J. (1937). In junk's Coleopterum catalogus (Scarabaeidae: Dynastinae) 21(156): 1-124.

Arrow G.J. (1931). The Fauna of British India including Ceylon and Burma, Lamell., III. (Coprinae), Taylor and Francis, London: V-XII 128 pp., 61 fig., 19 pls. map.

Biswas, S. and Chatterjee, S.K. (1986). Dung Beetle Fauna (Coleoptera : Scarabaeidae : Scarabaeinae) of Palmaou Tiger

Sr.No.	Subfamily	Scientific Name
I	Melolonthinae	<i>Holotrichia serrata</i> (F.)
		<i>Holotrichia fissa</i> (Br.)
		<i>Holotrichia carci</i>
		<i>Maladara sp. (light brown)</i>
		<i>Maladera sp. (dark brown)</i>
		<i>Leucopholis lepidophora</i> (Blanchard)
II	Rutelinae	<i>Brahmina sp.</i>
		<i>Anomala bengalensis</i> (Blanchard )
		<i>Adoretus indicus</i>
		<i>Rhinyptia indica</i> (Burm)
III	Cetoniinae	<i>Pradoretus sp. (Brenske)</i>
		<i>Anatona stillata</i> (Newman)
		<i>Chiloloba orientalis</i> (D&R)
IV	Aphodinae	<i>Oxycetonia versicolor</i> ( F.)
		<i>Anthracophora crucifera</i> ( Olivier)
V	Scarabaeinae	<i>Aphodius sp.</i>
		<i>Catharsius molossus</i> (Linnaeus)
		<i>Catharsius biramensis</i> (Lansb. )
		<i>Chironitis arrowi</i> ( Janssens)
		<i>Helicorpius sp.</i> (Fabricius)
		<i>Helocorpius tyranus</i> ( Thoms. )
		<i>Liatongus rhadamistus</i> (Fabricius)
		<i>Onitis philemon</i> (Fabricius)
		<i>Synopsis gilleti</i> ( Arrow )
		<i>Onthophagus unifasciatus</i> (Fabricius)
		<i>Onthophagus catta</i> (F.)
		<i>Onthophagus nasalis</i> ( Arrow )
		<i>Onthophagus acuticollis</i> . ( Arrow)
		<i>Onthophagus agnus</i> (Gillet)
<i>Onthopagus cervus</i> (F.)		
VI	Dynastinae	<i>Xylotrupes giedon</i> (Linn.)
		<i>Oryctes rhinoceros</i> (Linn.)

Reserve, Bihar, with a description of new species. *Rec. Zool. Surv. India.* 83(3&4): 57-67.

Balthasar, V.(1937). Monographie der Scarabaeidae und Aphodidae der palaearkischen und orientalistischen Region. Band 3. Praha: House Acad. Sci., 391 pp.

Balthasar, V. (1964). Monographie de Scarabaeidae und Aphodidae der palaearkischen und orientalistischen Region. Band 3. Praha: House Acad. Sci., 652 pp.

Chandla V.K., Misra, S.S., Bist, S.S., Bhala, O.P. and Thakur, J.R. (1988). White grub, *Brahmina coracia* (Hope) infesting Potato in Shimla hills. Seeds and forms. 14: 12-13.

Halfer, G. (1991). Historical and geological distribution of beetles (Coleoptera: Scarabaeidae: Scarabaeinae), *Folia Entomo. Mex.*, 82: 195-238.

Kailash Chandra ( 2000). Inventory of Scarabaeid beetles (Coleoptera) from Madhya Pradesh, India. *Zoos' Print Journal* 15 (11): 359-362.

Kumar, J., Sharma S.D., Lal, R. and Deor, B. S. (2005). White grubs damaging maize and paddy crops in Kullu and Mandi districts of Himachal Pradesh, Journal of Insect Sciences 5: 96.

Kumar, J., Sharma, S.D. and Ramesh Lal (2007). Scarabaeid Beetles of Kullu Valley, Himachal Pradesh. Entomol. 32(2):103-109.

Newton, N.M. and Malcolm, J.C. (1985). Dung Beetles in Kanha Tiger Reserve, Central Indian Highlands. *J. Bomb. Nat. Hist. Soc.* 85: 218-220.

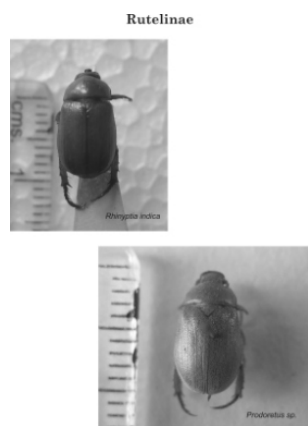
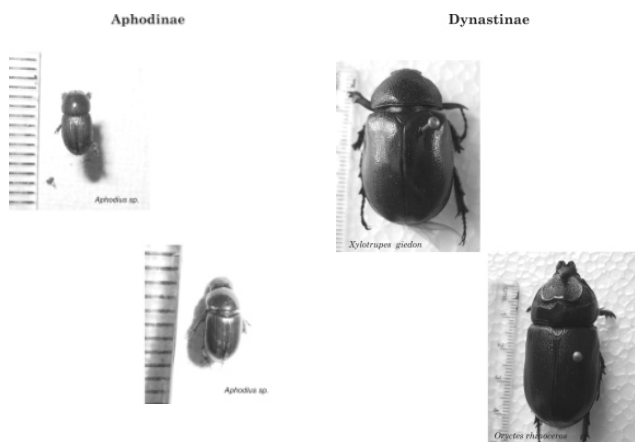
Mathews, E.G. (1972). A revision of the scarabaeine dung beetles of Australia I. Tribe Onthophagini. *Aust. J. Zool. Suppl. Ser.*, 9: 1-330.

Mathews, E.G. (1972). A revision of the scarabaeine dung beetles of Australia II. Tribe Scarabaene. *Aust. J. Zool. Suppl. Ser.*, 24: 1-211.

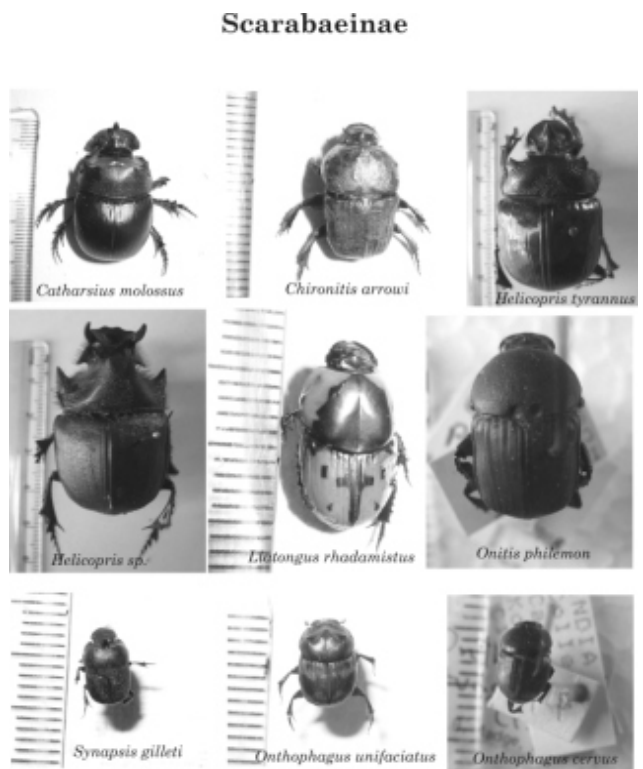
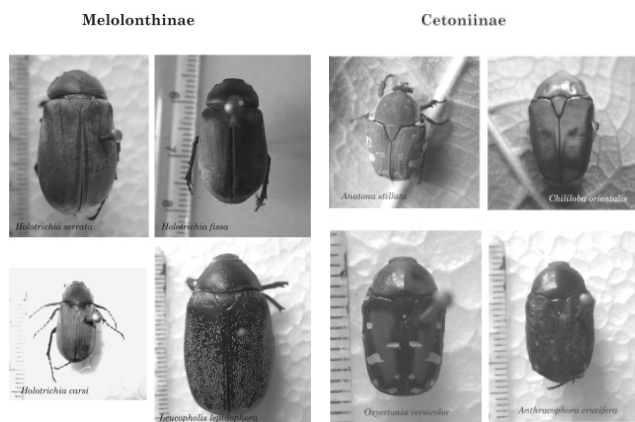
Shenkling, S. (1921). In junk; Coleopterum catalogus (Scarabaeidae: Cetoniinae) 21(72): 1-43.

Young R.M. (1989). Euchirinae (Coleoptera: Scarabaeidae) of the World: distribution and taxonomy. *Coleopt. Bull.*, 43:205- 236.

Young R.M. (1989). Euchirinae (Coleoptera: Scarabaeidae) of the World: distribution and taxonomy. *Coleopt. Bull.*, 43:205- 236.



**Scarabaeid Beetles from Kolhapur.**



## Small Brained Wonder - the Insects

Suvarna Rawal

Department of Zoology B.N.N. College, Bhiwandi, Dist. Thane.

**Abstract :** Insects diversity at Kamatgher, Bhiwandi was studied in the year 2008 the fauna included a good variety of Nymphalidae, Papilionidae, a moth and a few beetle types.

**Keywords :** Insect diversity, Nymphalidae, Papilionidae, beetle.

### Introduction

#### Why study insect?

Surely these small brained and sometimes repulsive creatures are the ultimate in insignificance, no more than minor and occasional nuisances in our technological world.

Insects are the most abundant of all living things in terms of numbers of kinds- at least million species- making up several dissimilar groups.

The unmatched ability of the insects to adapt to a variety of living conditions has gained them entrance to the more diverse habitat. Insecta is largest class in entire animal kingdom. There are 3 subclasses and 27 orders.

**Apterygota**(wingless) and **Pterygota**, the winged insects have 5 subclasses and 25 orders.

The great order of insects which comes before us is easily to be distinguished from the others; LEPIDOPTERA OR SCALLY WINGED INSECTS, the feathery scales with which their wings are covered being a distinction that one can recognize.

The colors of insects are just as diverse as their shapes. Here nature has its disposal a full palette of pigments to produce various hues.

#### Materials and Methods :

The insects in the kamatghar area of Bhiwandi, Dist. Thane were studied during summer vacation and part of monsoon period of year 2008. As far as possible photographs were taken on the camera of cell phone. Identification was done using the book on Indian butterflies by Kehimkar (2008) and with the help of the data on Internet.

As we are aware of human encroachment in nature territory, in densely populated city like Bhiwandi, dist. Thane, green belt is rarely seen. Even though certain areas still have maintained green areas where we experienced wonderful world of Insects.

Present collection is from Kamatghar of Bhiwandi, which once upon a time was dense forest with huge lake, supported by hard black stone hills, mixed plantation, where B.N.N. College was established in 1965.

### Observation :

During the study following type of insects were observed.

Common wanderer is sky blue fast flying butterfly and Common gull is yellow and white colored species.

#### Common wanderer *Pareronia valeria* and Common gull *Cepora nerissa*



#### Brush footed butterflies-

This group of butterflies has their first leg reduced to a brush like structure. The Brush-footed or Four-footed butterflies (Family Nymphalidae) are an extremely large group including some of the favorite butterflies. The wing margins of some Nymphalid butterflies are often notched and bear projections; together with the dusky coloration of the underside, this effectively camouflages the butterflies when they sit with their wings held together above the back, for then they look like dead leaves.



Common castor *Ariadne merione*



Common evening brown *Melanitis leda*



Great eggfly *Hypolimnas bolina*



Plain tiger



Dry season form of Peacock pansy *Junonia almana*.

Common castor caterpillars feed on castor plant *Ricinus communis*

Common evening brown butterfly is the commonest of brown butterflies. It is crepuscular species and gets attracted to the light.

Swallowtail butterflies

The genus Papilio (which is the Latin for Butterfly) has all the legs for walking, short palpi, the club of the antennae elongated and never hooked and the ' discoidal cell' closed. This is the cell formed in the middle of the wing by the juncture of the principal veins. All the insects of this genus are extremely handsome, and with few exceptions can be accepted as the most beautiful of all the butterflies.



Owlet moth

*Anthera pernyi* a silk producing moth. The general colour of this insect is dun-brown, with a few light and dark streaks arranged. The upper edge is marked by blackish dark streaks.

The other insects observed were-

Longhorned beetle which has the longest antennae in the beetle world

Weevil, a beetle which has long snout looking like an elephant

Tortoise beetle which resembles shell of a tortoise.

Blister beetles *Mylabris spp.* produce cantheridine, blister causing chemical which is used for protection of the individual.



Common jay *Graphium doson*