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Short Communication

Butterflies (Insecta: Lepidoptera) Biodiversity in and around Kakinada, in the State of Andhra Pradesh, India

*Elia Bandari, M.J.S. Sai Varma and M.Gangadhar
Department of Zoology, P.R. Government College (Autonomous), Kakinada, Andhra Pradesh, INDIA
***Corresponding author:** elijahalc@gmail.com
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Abstract: This work includes a list of 42 species of butterflies, under 5 families, identified during a nine-month study in the places in and around Kakinada. Out of the 42 species identified, 27 species occur in the campus of P.R. Government College, Kakinada and the rest in the places around Kakinada. Along with the list of Butterfly species identified, their present conservation status according to IUCN is also mentioned. Various threats to butterflies, especially in the vicinity of the study area are discussed and their conservation measures are also suggested.
Keywords: Andhra Pradesh, Butterflies, Biodiversity, Conservation, Kakinada.

Introduction

The beauty of butterflies drags everyone's attention, irrespective of their age. It provokes one's mind to explore their diversity, at least in the surroundings they live. In the 16th and 17th centuries butterfly collection started as a hobby and now catching of butterflies for trade is a big business with a world turnover of between US $20 to 30 million per year (Thomas Gay *et al*, 2008). Scientific aspects on butterflies like their taxonomy, migration, variations, mimicry, speciation and evolutionary biology were collected during early days itself. Today several species of butterflies are used by conservation biologists as indicator species to identify habitats that are critical and need to be protected (Issac Kehimkar, 2016). Butterflies are also monitored to indicate climate change and environmental degradation. There are about 18,000 species of butterflies in the world. India has 15,301 species, of which 321 are Skippers (Family Hesperiidae), 107 Swallowtails (Family Papilionidae), 109 Whites and Yellows (Family Pieridae), 443 Blues (Family Lycaenidae) and 521 Brush-footed butterflies (Family Nymphalidae) (See Arun Pratap Singh, 2011). Butterflies and moths are the second most species-diverse groups of Insecta with over 1,40,000 species (Krushnamegh Kunte, 2000). Variation within species of butterflies is quite common, occurring in size, shape, colour and also behavioural patterns. Four major types of variability, namely individual variability, sexual dimorphism, seasonal variability and geographical variability are found among butterflies (Thomas Gay *et al*. 2008).

Presently, butterflies are classified into two super families, of which Hesperiidea has all the Skippers, while Papilionidea includes the rest, the 'true' butterflies. Hesperiidea consists of a single family of Hesperiidae (Skippers), Papilionidea has four families: (i) Papilionidea (Swallow tails), (ii) Pieridae (Whites and Yellows), (iii) Lycaenidae (Blues) and (iv) Nymphalidae (Brush-footed butterflies) (Issac Kehimkar, 2016).

This work enlist Butterflies distributed in and around Kakinada of Andhra Pradesh State, with a more focus on P.R.Government College, Kakinada.

P.R. Govt. College, Kakinada, Andhra Pradesh, is rich in its floral and faunal diversity. This college has various trees which might have been planted a century ago and are labelled with their scientific names. Even before this study was conducted, we have observed a rich number of butterflies visiting the various plants in our college. Their wide distribution in our college has tempted us to explore their diversity not only in P.R. Government College, but also in the places around Kakinada.

Materials and methods

This study was conducted for a period of 09months i.e. from June 2015 to February 2016. Butterflies were identified following the descriptions of Wynter Blyth, 1957 and Isaac Kehimkar, 2016. All the photographs presented in this paper (Fig. 2) are original., captured using a Nikon D3200 camera with a zoom lens of 18-105mm

Study area

Kakinada is a port city and sixth largest in the state of Andhra Pradesh, India. It is located on the coast of Bay of Bengal (Fig. 1). P.R. Govt. College (16.9575° N, 82.2298° E) Kakinada, in which most of the butterfly species of this study were spotted, is spread over an area of 30 acres and rich in its floral and faunal diversity. The Coringa Wild life Sanctuary, the second largest stretch of mangrove forests is only 08Km from the college campus in Kakinada.

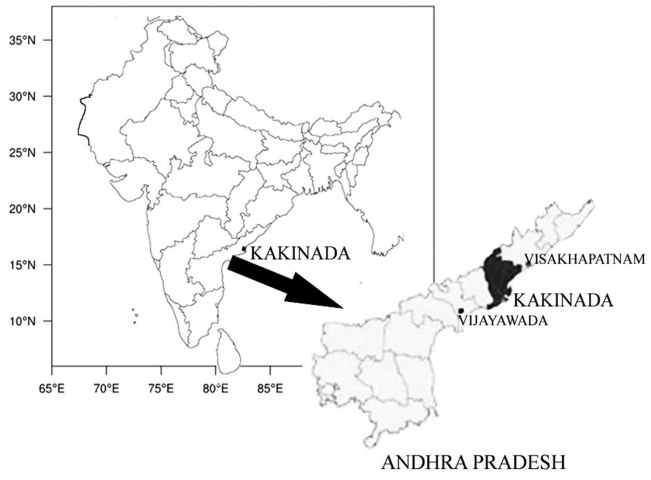


Fig. 1. Location of Kakinada city in the State of Andhra Pradesh.

Results

In our study, we could spot 42 species of butterflies in and around Kakinada (Fig. 2). Out of the 42 species we have identified, 27 species occur in the college campus and the remaining 15 species occur in adjoining areas of Kakinada. The butterflies species we identified during the study is mentioned in Table 1 and their pictures are presented in Fig. 2. The picture number in the figures correspond to the serial number mentioned in the Table 1.

Discussion

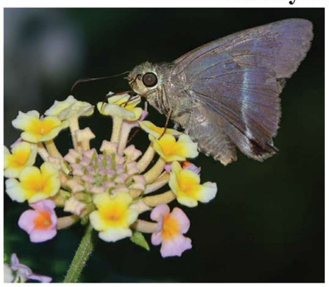
Of the 42 species of butterflies identified, 4 species each belong to the families Hesperiidae and Papilionidae, 8 and 7 species belong to the families Pieridae, and Lycaenidae respectively; and 19 species belong to the family Nymphalidae. Thus, the family Nymphalidae is the most speciose in the study area. Since P.R.Government College, is a good habitat for butterflies, a butterfly park may be established in the college premises. Many colleges/universities have botanical gardens but not butterfly parks. Mostly botanical gardens of colleges include either medicinal plants or plants which are of interest to a botanist. If the botanical gardens of college/university campuses also include plants which attract butterflies, we would be doing our bit in conserving these pollinators. It would be appropriate to have even butterfly parks exclusively in college/ university campuses just like botanical gardens.

While cleaning the campuses, in the name of 'Clean and Green' and 'Swatch Bharat' programmes, students are felling even the plants frequently visited by the butterflies, unmindful of the consequences on our fragile ecosystems. A healthy butterfly population is essential for agriculture as they are great pollination agents (Arun Pratap Singh, 2011). Hence, during cleaning programmes on the college/university campus, students should take care not to cut the plants which attract butterflies.

Table 1. List of Butterflies identified in and around Kakinada, Andhra Pradesh

S.No.	Common Name	Scientific Name	Spotted at	Status
Family: Hesperiidae (Skippers)				
1	Sulawesi violet Awl	*Hasora leucospila* (Mabille)	P. R. Govt College (A)	Not Common
2	Indian Ace	*Halpe spp.*	P. R. Govt College (A)	Common
3	Small Branded Swift	*Pelopidas spp.*	P. R. Govt College (A)	Common
4	Rice Swift	*Borbo cinnara* (Wallace)	P. R. Govt College (A)	Common
Family: Papilionidae				
5	Lime Butterfly	*Papilio demoleus Linnaeus*	P. R. Govt College (A)	Very Common
6	Common Mormon	*Papilio polytes* Linnaeus	P. R. Govt College (A)	Very Common
7	Common Rose	*Pachliopta aristolochiae* (Fabricius)	P. R. Govt College (A)	Common
8	Tailed Jay	*Graphium agamemnon* (Linnaeus)	P. R. Govt College (A)	Common
Family: Pieridae				
9	Mottled Emigrant	*Catopsilia pyranthe* (Linnaeus)	P. R. Govt College (A)	Common
10	Common Gull	*Cepora nerissa* (Fabricius)	P. R. Govt College (A)	Common
11	Common Emigrant	*Catopsilia pomona* (Fabricius)	P. R. Govt College (A)	Common
12	The Pioneer	*Belenois aurota* (Fabricius)	Chagallu, near Nidadavolu, AP	Common
13	Oriental Mottled Emigrant	*Catopsilia pyranthae pyranthae*	Chagallu, near Nidadavolu, AP	Common
14	Oriental Common GrassYellow	*Eurema hecabe hecabe* (Linnaeus)	Chagallu, near Nidadavolu, AP	Common
15	Small Salmon Arab	*Colotis amata* (Fabricius)	Chagallu, near Nidadavolu, AP	Common
16	Crimson Tip	*Colotis danae* (Fabricius)	Samalkot, AP	Not rare
Family: Lycaenidae				
17	Zebra Blue	*Leptotes plinius* Fabricius	P. R. Govt College (A)	Common
18	Dark Grass Blue	*Zizeeria karsandra*	P. R. Govt College (A)	Common
19	Pea Blue	*Lampides boeticus*	P. R. Govt College (A)	Common
20	Lime Blue	*Chilades lajus* (Stoll)	P. R. Govt College (A)	Common
21	Monkey Puzzle	*Rathinda amor* (Fabricius)	Jagannaickpur, Near Kakinada, A.P.	Not rare
22	Common Pierrot	*Castalius rosimon* (Fabricius)	Pithapuram, Near Kakinada, AP.	Common
23	Small Cupid	*Chilades parhassius* (Horsfield)	P. R. Govt College (A)	Locally Common
Family: Nymphalidae				
24	Blue Tiger	*Tirumala limniace* (Cramer)	P. R. Govt College (A)	Common
25	Blue Pansy	*Junonia orithiya* (Linnaeus)	Chagallu near Nidadavole, AP.	Common
26	Tawny Coster	*Acraea violae* (Fabricius)	P. R. Govt College (A)	Common
27	Joker	*Byblia ilithyia* (Drury)	Samalkot, AP.	Locally Common
28	Plain Tiger	*Dananus chrysippus* (Linnaeus)	P. R. Govt College (A)	Common
29	Grey Pansy	*Junonia atlites* (Linnaeus)	Samalkot, AP.	Locally Common
30	Common Crow	*Euploea core* (Cramer)	P. R. Govt College (A)	Common
31	Oriental Common Evening Brown	*Melanitis leda leda*	Jagannaickpur, Near Kakinada, AP.	Not rare
32	Chocolate pansy	*Junonia iphita* (Cramer)	Samalkot, AP.	Common
33	Common Evening Brown	*Melanitis leda* (Linnaeus)	Jagannaickpur, Near Kakinada, AP.	Common
34	Common Palmfly	*Elymnias hypermnestra* (Linnaeus)	Pithapuram, Near Kakinada, AP.	Common
35	Striped Tiger	*Danaus genutia* (Cramer)	P. R. Govt College (A)	Common
36	Peacock Pansy	*Junonia almana* (Linnaeus)	P. R. Govt College (A)	Common
37	Angled Castor	*Ariadne ariadne* (Linnaeus)	P. R. Govt College (A)	Uncommon
38	Lemon Pansy	*Junonia lemonias* (Linnaeus)	P. R. Govt College (A)	Common
39	Yellow Pansy	*Junonia hierta* (Fabricius)	P. R. Govt College (A)	Common
40	Common Leopard	*Phalanta phalantha* (Drury)	P. R. Govt College (A)	Common
41	Great Egg Fly	*Hypolimnas bolina* (Linnaeus)	P. R. Govt College (A)	Common
42	Danaid Egg Fly	*Hypolimnas misippus* (Linnaeus)	Chagallu, Near Nidadavolu, AP.	Common

Family Hesperiidae



1. Hasora leucospila (Sulawesi Violet Awl

2. Halpe spp.

3. Pelopidas spp.

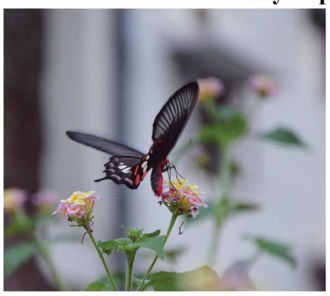
4. Borbo cinnara (Rice Swift)

Family Papilionidae

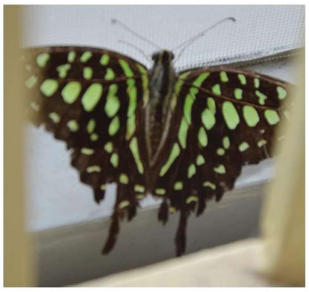
5. Papilio demoleus (Lime Butterfly)

6.Papilio polytes (Common Mormon)

Family Papilionidae



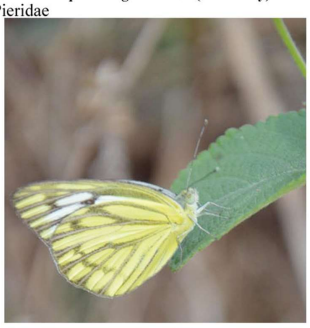
7. Pachliopta aristolochiae (Common Rose)



8. Graphium agamemnon (Tailed Jay)

Family Pieridae

9. Catopsilia pyranthe (Mottled Emigrant)



10. Cepora nerissa (Common gull)

11.*Catopsilia pomona* (Common Emigrant)

12. Belenois aurota (The Pioneer)

Family Pieridae

13. Catopsilia pyranthae pyranthae (Oriental Mottled Emigrant)

14. Eurema hecabe hecabe (Oriental Common Grass Yellow)

15.Colotis amata (Small Salmon Arab)

16.Colotis danae (CrimsonTip)

Family Lycaenidae

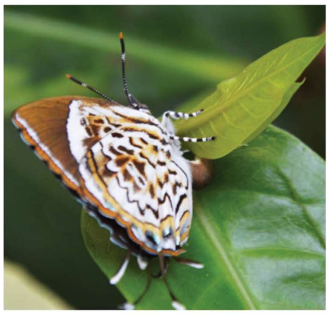
17.Leptotes plinius (Zebra Blue)

18.Zizeeria karsandra (Dark Grass Blue)

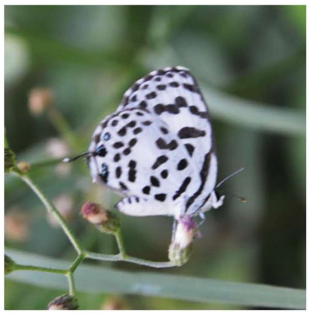
Family Lycaenidae

19. Lampides boeticus (Pea Blue)

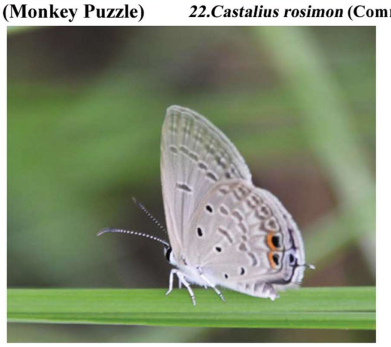
20.Chilades lajus (Lime Blue)



21.Rathinda amor (Monkey Puzzle)

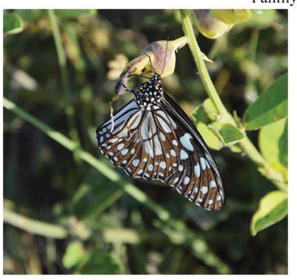


22.Castalius rosimon (Common Pierrot)



23.Chilades parrhassius (Small Cupid)

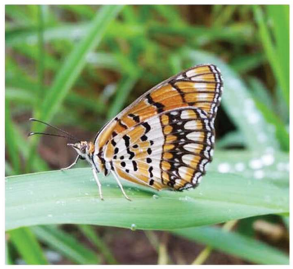
Family Nymphalidae



24.Tirumala limniace (Blue Tiger)

25.Junonia orithiya (Blue Pansy)

26.Acraea violae (Tawny coster)



27.Byblia ilithyia (Joker)

28. Danaus chrysippus (Plain Tiger)

29. Junonia atlites (Grey Pansy)

Family Nymphalidae

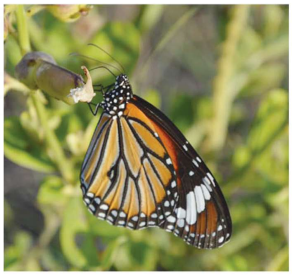
30.Euploea core (Common crow)

31. Melanitis leda leda (Oriental Common Evening Brown)

32. Junonia iphita (Chocolate Pansy)

33. Melanitis leda (Common Evening Brown)

34. Elymnias hypermnestra (Common Palm Fly)



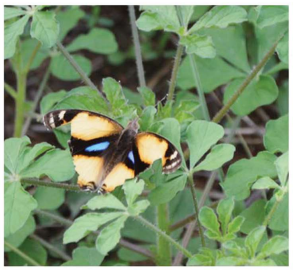
35.Danaus genutia (Striped Tiger)

Family Nymphalidae

36.Junonia almana (Peacock Pansy)

37.Ariadne ariadne (Angled Castor)

38.Junonia lemonias (Lemon Pansy)



39.Junonia hierta (Yellow Pansy)

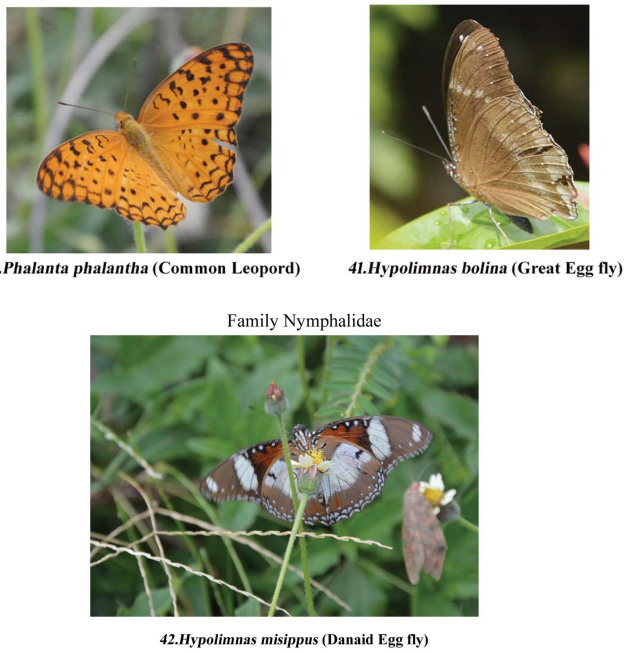


Fig. 2. Digital images of Butterflies distributed in and around Kakinada, Andhra Pradesh.

Butterfly farming can be taken up as a conservation measure and can provide an alternative means of livelihood to forest dwellers. The forest dwellers when taught about butterfly farming, would earn their living on this renewable resource knowing fully well that this 'resource' will last as long as there is a good habitat. Thus, the farmers will have an interest in protecting the habitat of butterflies.

Large tracts of forest area have been cut forrapid urbanisation and to implement commercial monoculture plantation of teak or rubber (Thomas Gay et al, 2008). There has been indiscriminate use of pesticides (see Krushnamegh Kunte, 2000) which kills even non-target species. Hence, it is important to first assess the impacts of agricultural practices on butterfly populations,then encourage farmers to adopt eco-friendly practices, like integrated pest management, organic farming, and finally suggest a plan whereby farmlands can support butterfly populations by farming in a wildlife-friendly way (Issac Kehimkar, 2016).

In cities where traffic islands occur, plants which attract butterflies should be planted so that the local butterflies are conserved.

Due to the development of an extensive road network during the preceding few decades, many enchanting and pristine environments have turned a killing field for minor creatures like butterflies (Harpal Singh, 2015, The Hindu news Paper). Lakhs of butterflies are killed in road accidents during monsoon. This could have an impact on the butterfly population in the long run and eventually result in economic loss to humans. Road kills of these economically and farmer-friendly creatures result in loss of cross-pollination in plants which certainly impacts crop yields. In the areas where there is an extensive road network, there is a danger of the migrating butterfly swarms getting collided with the moving vehicles. Such road kills will have an impact on the butterfly population (Harpal Singh, 2015, The Hindu news Paper). In such areas the traffic has to be regulated.

Now-a-days ecotourism is very popular (Arun Pratap Singh, 2011). Specific tours to watch butterflies are gaining popularity, like birding tours (Issac Kehimkar, 2016). Kakinada and its surrounding areas like Coringa Wild life Sanctuary, Rampachodavaram, Maredumilli forest reserve has great potential to exploit this avenue, which could benefit people in and around the forest so that they in turn would protect the forests that attract tourists.

Most Indian butterflies are now protected under the Wildlife Protection Act, 1972 (Krushnamegh Kunte, 2000), which implies that catching and killing of threatened species is illegal. However, laws on paper are not likely to save wildlife unless sufficient measures are taken simultaneously to protect their habitats, generate public awareness and make local people partners in conserving butterfly habitats.

Conclusion

1. Studies on taxonomy, migration, variations, mimicry, speciation and evolutionary biology of butterflies is a continuous process and hence youngsters should be motivated to take up study of butterflies as well along with other invertebrate and vertebrate groups.
2. Butterfly farming should be taught to forest dwellers as a conservation measure which may even become an alternative source of livelihood for them.

3. While cleaning the schools, colleges and universities care should be taken not to cut the butterfly attracting plant species
4. As a conservation measure, in cities where traffic islands occur, plants which attract butterflies should be planted
5. Along with stringent measures like Wild Life Protection Act, 1972 and generating public awareness about these winged creatures, local people should be made partners in conserving butterfly habitats.

Acknowledgement

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