

## Faunal Diversity of Butterflies in Tehsil Shabqadar District Charsadda, Khyber Pakhtunkhwa, Pakistan

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### Abstract

Butterflies are the most beautiful and attractive insects in class insecta, order Lepidoptera. Economically they are important as pollinators as well as environmental indicators. The aim of this study was to evaluate the fauna diversity of butterflies in Tehsil Shabqadar, District Charsadda. A total of 250 specimens were collected and identified which yielded 3 families, 10 genera and 13 species. Nymphalidae family comprised the largest number of individuals followed by Pieridae and Papilionidae. The species were lime butterfly, *Papiliodemoleus* (Linnaeus); common grass yellow, *Euremahecabe* (Linnaeus); blue pansy, *Junoniaorytha* (Linnaeus); plain tiger, *Danauschrysisippus* (Linnaeus); Indian Cabbage White, *Pieriscanidia* (Linnaeus); common leopard, *Phlantaphlantha* (Drury); peacock pansy, *Junoniaaalmanna* (Linnaeus); emigrant or lemon emigrant, *Catopsiliapomona* (Fabricus); mottled emigrant, *Catopsilapyranthe* (Linnaeus); Bath white, *Pontiadaplidice* (Linnaeus 1758); common castor, *Aridnaemerione* and *Bellusaurota*. The most encountered species found was *Catopsilapyranthe* whose 43 specimens were collected. The least encountered species was *Bellusaurota* and *Catopsiliapomona*. 12 species with 10 genera belonging to 3 families from 13 study sites suggests that this region may have a diverse butterfly fauna. Similar surveys on large scales are recommended to fully evaluate the butterfly fauna of District Charsadda.

**Keywords:** Pollinator, Terrestrial Habitat, Fauna, District Charsadda.

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## INTRODUCTION

Charsadda, located in the west of Khyber Pakhtunkhwa province is 17 miles away from the provincial capital Peshawar. The district lies in 71° 28' 13" to 71° 56' 12" east longitude and 34° 2' 53" to 34° 27' 34" north latitude (Figure 1). The total area of the district is 996 square kilometers. Charsadda is situated very close to the Indus River at the area very fertile for agriculture.

Butterflies are one of the most conspicuous species of Earth's biodiversity. They act as suitable equipment for biodiversity study as the shortfalls are few (Hortal *et al.*, 2015). Butterflies may have one or more broods per year. The number of generations per year varies from temperate to tropical regions with tropical regions showing a trend towards multivoltinism. They are common for only a few months and rare or absent in others. The seasons when they are rare or not active as adults are usually spent either as

caterpillars or as pupae. The months when the adults are active are called as the "flight period" (Varshney, 1983; Gaonkar, 1996). Further butterflies, can act as the role model group from the conservational point of view (Ehrlisch and Hanski, 2004).

Some types of butterflies inhabit very high altitudes except those areas where the annual temperature is low (Hassan, 1997). They have an important role for cross fertilization when they take in the nectar from flowers (Kearns and Inouye, 1997). Butterflies are also known as the sign of beauty, elegance and are very known fly due to their diurnal habitats and are voluntarily familiar by their cheerful colors, outlines and beautiful flights (Owen, 1971; Dal, 1978). Various butterflies display long distance migration. Monarch butterfly shows migration of about 4000-4800 km from Mexico to northern USA and southern Canada (William, 1927).

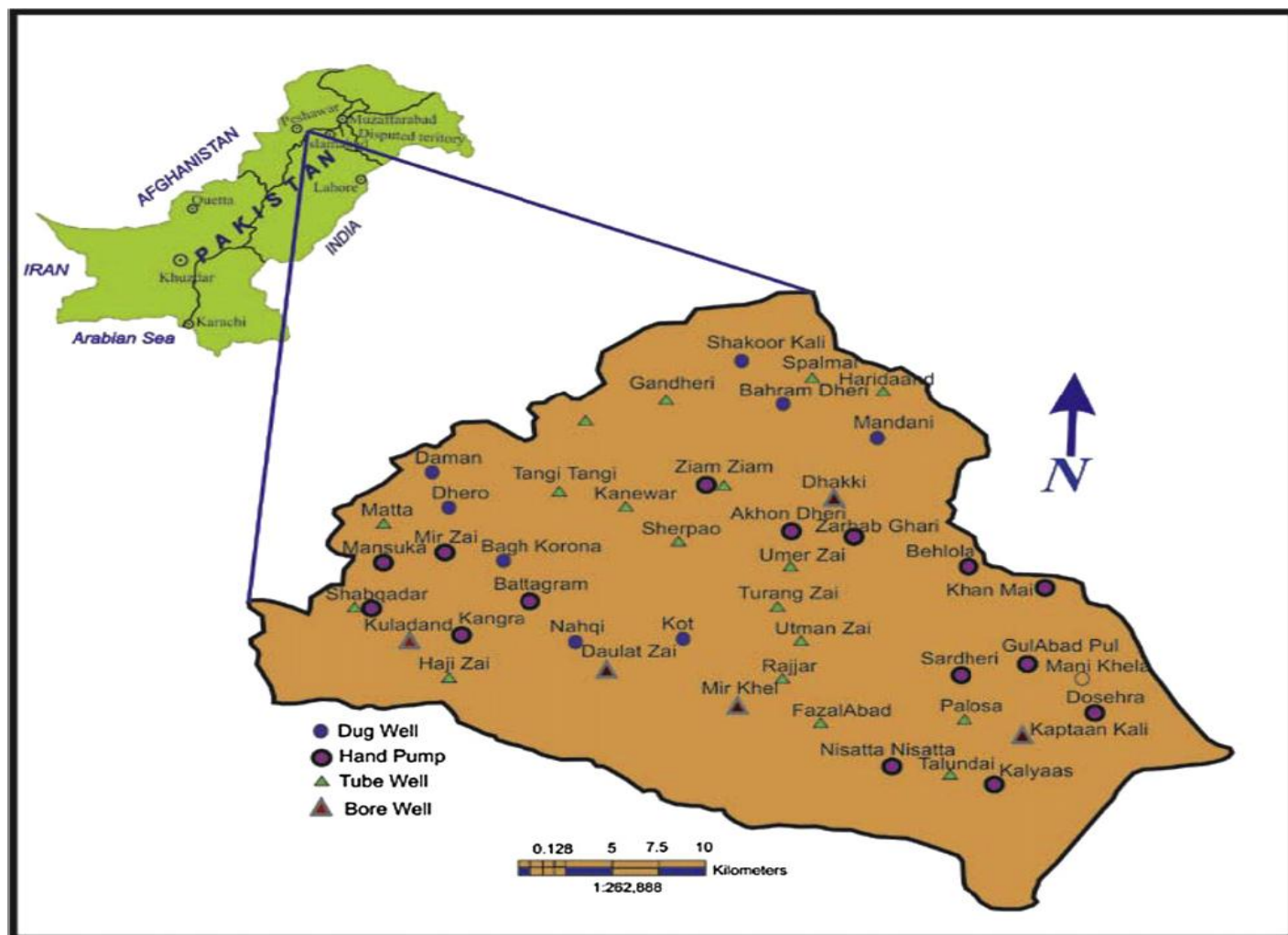


Fig.1. Map of tehsil Shabqadar district Charsadda

In the world, the diversity of butterflies is not equally distributed, therefore conservation of butterflies is very difficult to realize, and some active changes are needed to take for this purpose (Gaston, 2000). Butterflies exhibit polymorphism and mimicry. Some butterflies have parasitic relationships with organisms including protozoans, flies, ants, other invertebrates, and vertebrates (Leong, 1997). Butterflies in their adult stage can live from a week to nearly a year depending on the species. Many species have long larval life stages while others can remain dormant in their pupal or egg stages and thereby survive winters (Powell, 1987). Butterflies and their larva (caterpillars) are dependent on specific host plants for foliage, nectar and pollen as their food. Thus butterfly diversity reflects overall plant diversity, especially, that of herbs and shrubs in the given area (Nimbalkar, 2011). So, loss of butterflies from any community would start the “butterfly effect” continuing to affect the entire ecosystem, working its way up to the trophic levels (Altermatte and Pearse, 2011). It is essential that we

document the butterfly fauna of certain regions so that steps may be taken to ensure the survival of these fascinating creatures for future generations. There is little that can be done to save our butterflies once their habitats are destroyed. Thus it is important to manage our environment and avoid further damaging the already fragile balance of nature (Whalley, 1992). Literature review revealed that fauna diversity studies of butterflies in district Charsadda have not been carried out. Therefore, the objective of this study was to assess species diversity of butterflies from different locations of Tehsil Shabqadar, District Charsadda, KP, Pakistan.

## MATERIALS AND METHODS

The recent study was conducted in sixteen localities of Tehsil: Shabqadar, district Charsadda, KP, Pakistan which include; Mandezai, Hassanzai, Katozai, Marozai, Mirzai, Nusrartzai, Mathra old, Mathra new, Kotak, Battagram,

Gonda, Kangra, Matta mughal khel, Srikh, Sokhta and Shabqadar village during, July 2015 to February 2016.

### Collection and preservation

Butterflies were collected casually consuming sweep net and stripped hands. Collected species were then placed in chloroform bottle. Bottles were provided with cotton soaked chloroform in order to kill butterflies. The specimen was trapped and the body fragments were labeled on thermophile setting board in laboratory. Each specimen was labeled for (a) place of capture, (b) date of collection, and (c), the collector's name and kept it in the collection boxes.

### Identification

Butterflies were identified using data from previous literature. Some identified specimen from National Insects Museum (National Agricultural Research Centre) Islamabad, Pakistan helped identification of species easily. The recognized specimens were placed in the Gallery of Department of Zoology, Hazara University, Mansehra, Pakistan.

### Morphological study

Identified specimens were subjected to measurement of their total body length and wing span with the help of graph paper and ruler.

### Photography

After identification of specimens, they were placed one after another on topmost of white soft paper. Photographs have been taken on ventral side along with dorsal side with camera.

## RESULTS AND DISCUSSION

The current study was directed for the identification and distribution of butterflies of tehsil Shabqadar, District Charsadda, Khyber Pakhtoonkhwa. A total of 250 specimens were collected from 16 localities i.e. Mandezai, Hassanzai, Katozai, Marozai, Mirzai, Hajizai, Mathra old, Mathra new, Kotak, Battagram, Gonda, Kangra, Matta mughal khel, Srikh, Sokhta and Shabqadar village during, July 2015 to February 2016. Identification of these butterflies showed 12 species of 10 genera belonging to three families. The data analyzed through ANOVA showed length and wing span of butterflies from the collected data (Table 1). The survey showed 10 genera, among them *Junonia*, *Catopsilia*, *Danaus* and *Aridnae* contained 51, 47, 36 and 29 specimens respectively were dominant in collected data. The results revealed that the highest number of species in the area was *Catopsilia pyranthe* 42 followed by *Danaus chrysippus* 36, *Junonia orytha* 30 (Figure 1). Village Mondezai was the richest in diversity having 54 butterflies in tehsil Shabqadar because of suitable environment of survival (Table 2). Four

trips were arranged for collection of butterflies, it was observed that in the month of August there was highest diversity found in area having 94 specimens (Table 3). Family Nymphilidae comprised largest number of individuals i.e. 131, followed by Pieridae with 91 individuals and 25 individuals of Papilionidae. Species belonging to family Nymphilidae were significantly higher 53%, family Pieridae also showed the maximum 37% followed by family Papilionidae 10% in small study area (Figure 2). Various studies supported our findings which documented Nymphalidae as the most dominant butterfly family in terms of species composition (Chowdhury and Soren 2011; Kumar and Murugesan, 2014; Ghosh and Saha, 2016). High abundance of Nymphalids may be due to the availability of their specific larval host plants and food plants in the study area (Saikia, 2011).

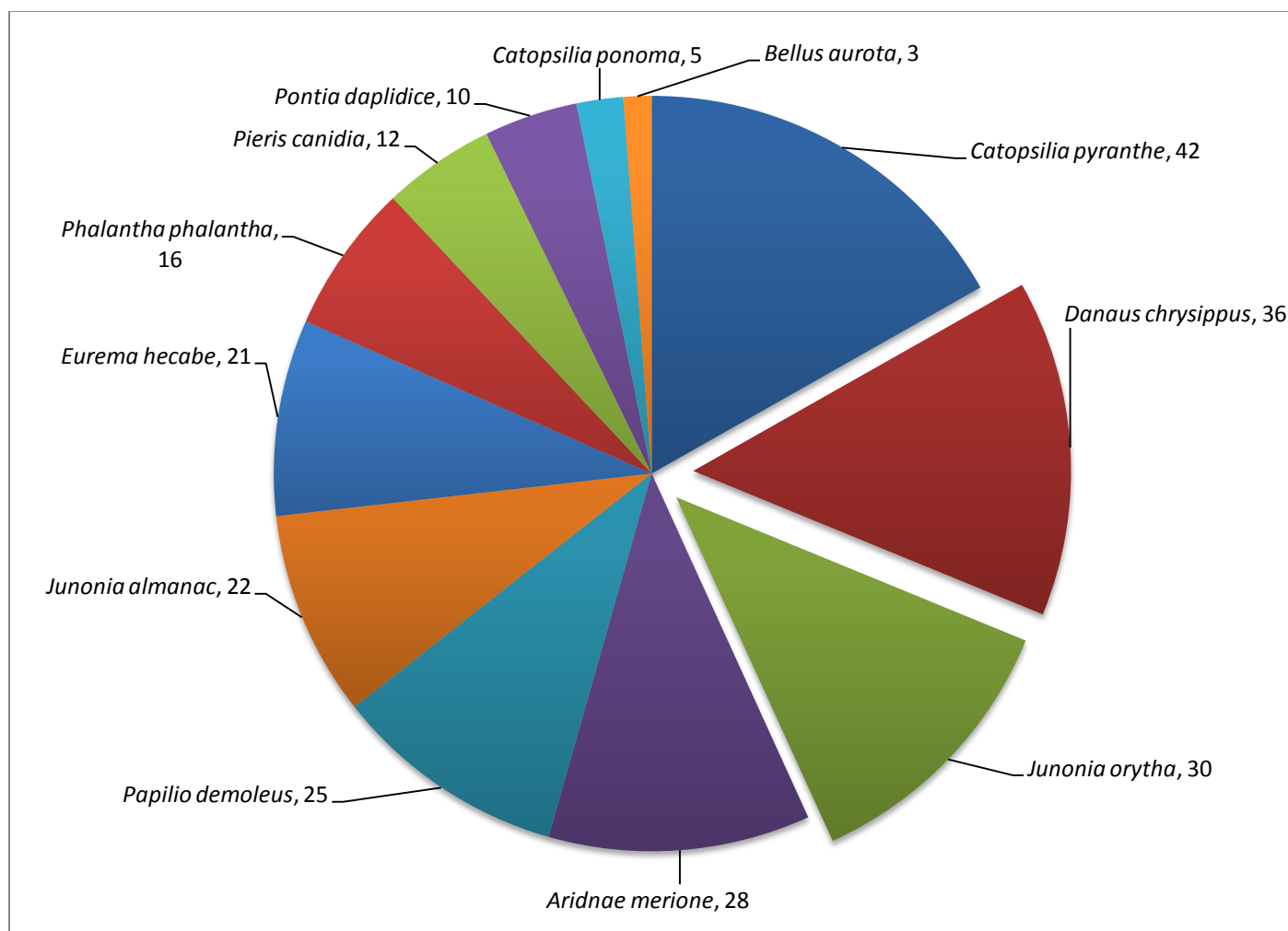
Identification revealed that 12 different species in 10 genera belonging to 3 families were identified from study area. Collected species were *Papilio demoleus*, *Danaus chrysippus*, *Eurema hecabe*, *Bellus aurota*, *Catopsilia ponoma* (Figure 3a-e), *Junonia orytha*, *Pieris canidia*, *Phalanthia phalanthia*, *Junonia almana*, *Catopsilia pyranthe*, *Ponlia daplidice* and *Aridnae merione*. The most encountered species was *Catopsilia pyranthe* whose 42 specimens were collected from all the localities. The least encountered species was *Catopsilia crocail* and *Bellus aurota*.

Haroon *et al.* (2014) explored the butterfly fauna of Union Council Koz Behram Dheri, Tehsil Tangi, district Charsadda and reported 13 butterfly species with 11 genera belonging to 3 families, Nymphilidae, Pieridae and Papilionidae. Family Nymphilidae comprising the most number of species, followed by Pieridae and Papilionidae. The present survey conducted from Tehsil Shabqadar, District Charsadda, showed great similarity with previous study. Perveen and Haroon, (2015) documented 506 specimens belonging to 3 families with 18 genera and 23 species from Tehsil Tangi, Khyber Pakhtunkhwa, Pakistan. Naz *et al.* (2001) analyzed the diversity of butterfly fauna of Bunair, K.P., collecting 450 specimens and identified, 36 spp. having 25 genera and 8 families. These findings were against our results as they showed family Pieridae as dominant.

In previous studies, Hamer *et al.* (2005) found significantly different species diversity of butterflies in drier seasons and lodged forests in Bornean region of Malaysia. Hill *et al.* (2006) revealed high level of genetic diversity in butterflies species found in Scotland and England. There are several reports about distribution of butterflies in India (Sharma and Joshi, 2012; Majumder *et al.*, 2012; Raychaudhuri and Saha, 2014; Mukherjee *et al.*, 2015; Ghosh and Mukherjee, 2016).

**Table 1. Wing span (mm) and Body length (mm) of butterfly species collected throughout July-October 2014 from Tehsil Shabqadar District Charsadda, KP, Pakistan and the data was analyzed by one way ANOVA.**

| S.No. | Name of Species            | No. of animals | Wing span (mm) (Mean± SD) |            | Body length (mm) |
|-------|----------------------------|----------------|---------------------------|------------|------------------|
|       |                            |                | Fore Wings                | Hind Wings |                  |
| 1     | <i>Catopsilia pyranthe</i> | 42             | 11.75±0.85                | 8.75±0.81  | 9.5±0.87         |
| 2     | <i>Danaus chrysippus</i>   | 36             | 13.5±1.38                 | 7±1.2      | 9.5±0.85         |
| 3     | <i>Junonia orytha</i>      | 30             | 9±0.60                    | 6±0.40     | 7±0.45           |
| 4     | <i>Aridnae merione</i>     | 28             | 10.5±0.61                 | 8±0.70     | 8±0.57           |
| 5     | <i>Papilio demoleus</i>    | 25             | 15.5±0.75                 | 7.5±0.79   | 10±0.48          |
| 6     | <i>Junonia almanac</i>     | 22             | 9.75±0.61                 | 6.5±0.70   | 7.5±0.65         |
| 7     | <i>Eurema hecabe</i>       | 21             | 8±1.26                    | 5.5±0.89   | 7±0.94           |
| 8     | <i>Phalantha phalantha</i> | 16             | 10±0.80                   | 8±0.77     | 7.8±0.62         |
| 9     | <i>Pieris canidia</i>      | 12             | 9.5±0.85                  | 6±0.86     | 7.30±0.62        |
| 10    | <i>Pontia daplidice</i>    | 10             | 10±0.94                   | 8.25±0.90  | 5.75±0.48        |
| 11    | <i>Catopsilia ponoma</i>   | 5              | 14±0.57                   | 11±0.75    | 9.75±0.57        |
| 12    | <i>Bellus aurota</i>       | 3              | 9.3±0.57                  | 6.25±0.87  | 7±1.15           |



**Fig. 1. Species wise distribution of butterfly's collected from Tehsil Shabqadar, District Charsadda, KP, Pakistan.**

**Table 2. Area wise distribution of butterfly's species.**

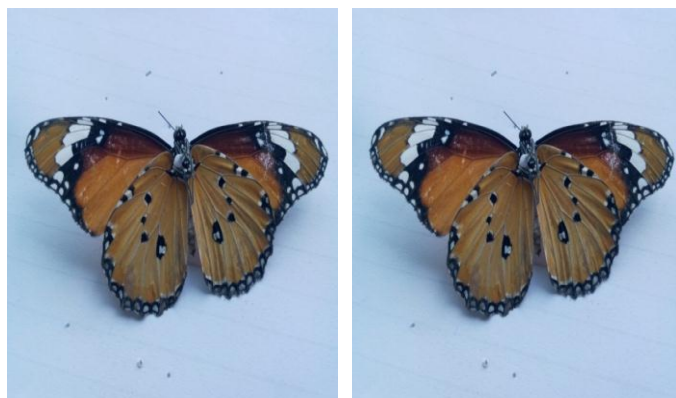
| S.NO. | Locality          | Total number of specimens |
|-------|-------------------|---------------------------|
| 1     | Mandezai          | 54                        |
| 2     | Hassanzai         | 20                        |
| 3     | Katozai           | 17                        |
| 4     | Marozai           | 8                         |
| 5     | Battagram         | 26                        |
| 6     | Mirzai            | 6                         |
| 7     | Matehra New       | 9                         |
| 8     | Matehra Old       | 11                        |
| 9     | Sokhta            | 12                        |
| 10    | Shabqadar village | 15                        |
| 11    | Kangra            | 10                        |
| 12    | Nusratzai         | 9                         |
| 13    | Kotak             | 8                         |
| 14    | Srikh             | 16                        |
| 15    | Gonda             | 14                        |
| 16    | Matta Mughal Khel | 15                        |



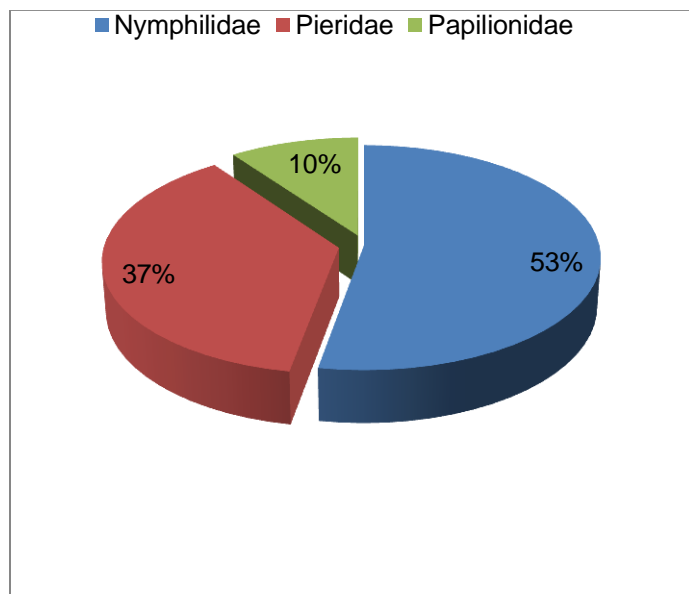
**Fig. 3a.** *Papilio demoleus* (Left: Dorsal view; Right: Ventral view)

**Table 3. Monthly wise distribution of butterflies' species.**

| S.NO. | Locality  | Number of collected species |
|-------|-----------|-----------------------------|
| 1     | July      | 68                          |
| 2     | August    | 94                          |
| 3     | September | 52                          |
| 4     | October   | 36                          |



**Fig. 3b.** *Danaus chrysippus* (Left: Dorsal view; Right: Ventral view)



**Fig. 2. Percentage of Butterflies families collected from Tehsil Shabqadar, District Charsadda, KP, Pakistan.**



**Fig. 3c.** *Eurema hecabe* (Left: Dorsal view; Right: Ventral view)



**Fig. 3d.** *Belous aurota* (Left: Dorsal view; Right: Ventral view)



**Fig. 3e.** *Catopsilia ponoma* (Left: Dorsal view; Right: Ventral view)

## CONCLUSION

A large number of butterflies were collected from Mandezai and least from Mirzai. Twelve spp. of butterfly's belonging to 3 families from a minor study area, proposes that this region having large and rich fauna of butterfly's. Exploring fauna will help to take necessary measures for conservation of biodiversity in the area.

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## CONFLICT OF INTEREST

The authors declare that they don't have any conflicts of interest and are also not interested in competing with anyone.

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