Article

Characteristics of family Pieridae (Lepidoptera) in Tehsil Tangi, Khyber Pakhtunkhwa, Pakistan

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Abstract

The butterflies are the most beautiful and colorful insects of the world. Which attract most of the animals for their food easily available. The present research were conducted at Tehsil Tangi, Khyber Pakhtunkhwa, Pakistan during August 2014 to May 2015. The family Pieridae were collected with the help of insects net and naked hands. A total of 8 species and 6 genera were collected, i.e., Common or lemon emigrant, *Catopsilia ponoma* Fabricius; Mottled emigrant, *Catopsilia pyranthe* Linnaeus; Clouded yellow, *Colias fieldii* Fabricius; Common grass yellow, *Eurema hecabe* Linnaeus; Eastern pale clouded yellow butterfly, *Colias erate* Esper; Indian cabbage white, *Pieris canidia* Sparrman; Indian little orange tip, *Colotis etrida* Boisduval; Pioneer white or African caper white, *Belonias aurota* Fabricius. Aims of the present research the characteristics of butterfly fauna from Tehsil Tangi, are helpful in awareness, education and further research. A detail study is required for further exploration of butterflies' fauna of Tehsil Tangi.

Keywords butterfly; characteristics; Tangi; Pieridae.

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1 Introduction

The butterflies are the most beautiful and gorgeous insects and have captivated human fancy and imagination through plant life cycle (Borges et al., 2003). They are commonly referred to as "insects of the sun" with their eye catching color and delicate charisma. They have been admired for centuries for their physical beauty and behavioral display (Arya et al., 2014). They are a good food for predatory insects a well as for reptiles and birds, where they can freely flight from one flower to another to collect the nectar (sap) and make a food chain for the ecosystem network (Sharma and Joshi, 2009). Their larvae and adult are herbivore mainly sucking the flower sap and plant leaf including ecosystem functioning, pollination and some species dependent on rotten flesh. They can be studied as prospective natural indicators for their conservation (Bonebrakeand Sorto, 2009).

Additionally, they were divided into two groups as fruit feeding and nectar suckling. Mostly, adult butterflies sap the nectars from the flowers and young shots juice, while some of them are survival on rotting flesh and fruits, e.g. purple emperor, *Apatura iris* Linnaeus, 1758 (Haroon et al., 2014). The combination of such high rates of tropical deforestation with the high species richness of tropical forests means that tropical forests are likely to be extinction hotspots (Stork et al., 2003). Therefore, the invertebrates mainly depend on host plants for their organic and inorganic components uses of the ecosystem. However, some insects are carnivorous eat the flesh of human being and other animals, they also used their blood for life cycle purposes (Haroon et al., 2015). Furthermore, the natural changes were destroy the more habitat destruction, while the dramatic changes were also caused by the man (Lafontaine, 1997). Somehow, the abundance of the species were also cause the habitat destruction and the community boundaries were disturb (Peer et al., 2011). Therefore, the profusion and circulation of butterflies were less at the point where the habitat destruction due to land uses and climatic changes (Kumar et al., 2013).

Because of their variety, wide distribution, specificity to vegetation, rapid response to perturbation, taxonomic tractability they have been considered useful organisms to monitor environmental changes (Kumar and Mattu, 2014). Territory deficiency was the major cause and hazard to steamy insects effects of microclimate modification might rapidly be additional widespread, pointers of conservational commotion or ecological variation (Basset et al., 2011). Except Arctic and Antarctic region butterflies are originate entirely over the world with different environments, like tropical forest and especially tropical rain forest. Butterflies having scaly and colorful wings with two pair of antennae and exoskeleton. By way of age, the wings become ragged when the wings fades (Perveen et al., 2014). The habitat of butterfly are obviously different because the larvae of these insect mostly depend on their host plant yet larvae are typically professional feeders and some necessitate a precise host plant for its nourishment. While adult butterfly can get their food from rotten fruit, nectar and juice (Khan and Perveen, 2015).Therefore, to attract the attention of biologist and naturalist, diversity of colures and decorations of the butterflies wings for more than a century. Its pleasure to everyone to attract and see the graceful flight, wonderful structure and cheerful colour. They are very sensitive to the seasonal variation, habitat deprivation and rapid life cycle than the other higher animals. Additionally, they detrimental the various crops, because most of their life span were left on plant host (Perveen, 2012).

The Tehsil Tangi is situated in the District Charsadda, Khyber Pakhtunkhwa (KP), Pakistan. Moreover, according to census report of 2000, more than 1.7 million people were live in Charsadda. Therefore, total area are 996 km^2, in addition, Pushkalavati was the first name of district Charsadda, which mean 'Lotus City', because they famous for lotus roots, *Nelumbo nucifera*, known as barsanday. Although, at that time the administrative centre of Gandhara kingdom is Pushkalavati. Additionally, in Charsadda there are 3 rivers: the Jindi, Kabul and Swat are main source of irrigation for it.Therefore, they were join and merge to the Indus River at Attock (Provincial boundary of Punjab and Khyber Pakhtunkhwa). Although, River Swat merges with Kabul at Shahbara near to District Peshawar, and Kabul River merges with River Indus at Attack (Haroon et al. 2013) (Fig. 1). The objective of the present research to prepare the characterized the family Pieridae of Tehsil Tangi, Khyber Pakhtunkhwa, Pakistan for awareness and education of the community.

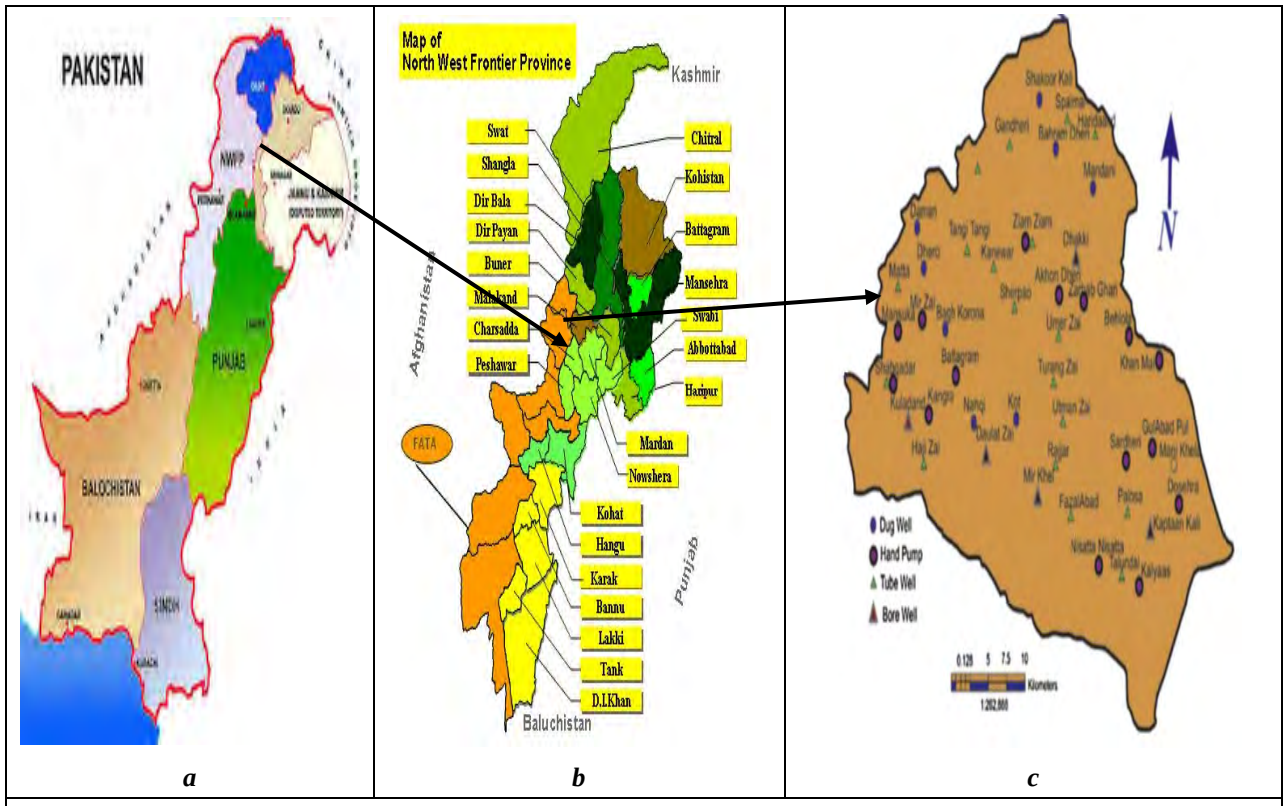


Fig. 1 Map of Tehsil Tangi, Khyber Pakhtunkhwa, Pakistan, in which the present survey on butterfly fauna was conducted during August 2014-May 2015: a) map of Pakistan; b) map of Khyber Pakhtunkhwa; c) map of Charsadda showing Tehsil Tangi with the 8 quadrates of the study area (Online, 2015).

2 Materials and Methods

2.1 Selection of localities

The study area were separated in eight quadrates from where the butterflies collected during August 2014 to May 2015, from Tehsil Tangi. The localities selected and depending on the road links available and at least 10-15 kilometers apart from each other and the maximum area of each locality covered during the sampling. All sorts of fruit trees from each locality selected such as grass, shrubs, nurseries, apples, plums, pears, apricots, peaches and wild flowers.

2.2 Materials

For the collection of butterflies following instruments and chemicals were used. Sweep net, chloroform bottle, digital camera and insect's pins, setting boards, insect boxes, naphthalene balls, ruler and field book.

2.3 Collection and preservation of butterflies

The butterfly fauna of Tehsil Tangi was surveyed from August, 2014 to May, 2015. Specimens was accompanied on locations subject by the most representative vegetation types of the region and agriculture land for cultivation of vegetables and fruits. To collect the species and explore their diversity, use a three meter long handed sweep net having 1 meter long net cloth and 1 foot width or volume. Collection was restricted for those species which could not be identified. The collected specimens were brought from the insects collection nets. The collected live species were killed by pinching transversely their thorax by charming appropriate taking keep all parts of the specimens or placed them in to cotton soaked chloroform bottles for short time of period to kill them. After killing the butterflies the collected were subjected for preservation. The specimens were pinned by entomological pins according to their size of specimens their body parts were stretched and set

their forewing on 180° with help of thermopile setting board in laboratory. The preserve specimens were properly subjected for their scientific name, common name and date of collection. After 2 days on draying their parts and stretched, the specimens were accurately labelled and mounted in the collection boxes. Finally the Naphthalene balls were placed in the boxes to keep the specimens safe from the pests.

2.4 Identification of butterflies

Butterflies were identified with the help of keys, and available literature. Help was also taken by already identified specimens placed in National Insect Museum, (NARC) Islamabad by Muhammad Athar Rafi, Director National Insect Museum Islamabad, Pakistan. All the identified specimens were deposited in the National History Museum (NHM) of Department of Zoology Shaheed Benazir Bhutto, University Main Campus Sheringal, Dir Upper, Pakhtunkhwa, Pakistan.

2.5 Storag*e*

The identified specimens was stored partly deposited National History Museum (NHM) of Department of Zoology Shaheed Benazir Bhutto, University Main Campus Sheringal, Dir Upper, Pakhtunkhwa, Pakistan and partly in the National Insect Museum (NIM), National Agricultural Research Centre (NARC), Islamabad, Pakistan.

The rank lists were prepared from each locality according to the maximum abundance with the help of which the diversity indices calculated and the collective rank lists along with the lists of the taxa from whole Tehsil were also prepared.

2.6 Morphological study

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

2.7 Photography

After the identification and measurement of specimens, they were placed one by one on top of a light blue paper. Photographs were taken on ventral side as well as by dorsal side by using digital camera, Yashica (14.2 megapixels), made in China.

3 Results

3.1 Common or lemon emigrant, *Catopsilia ponoma*

Morphological characters

The common or lemon emigrant,*Catopsilia ponoma* Fabricius, 1775; is a mediocre extent butterfly,the upper side of the male is chalky white female ground color from upper side, antennae are red in color, unclearly spots were present like black, while head and palpi were mostly red above, the thorax long yellow and dressed, on the body greenish hairs were present, pale yellow abdomen, while dark yellow at thorax and palpi and some parts of the abdomen. *Catopsilia ponoma* are very common butterfly found everywhere in the world except Arctic and Antarctic regions because they are very cold (Fig. 2).

3.2 Mottled emigrant, *Catopsilia pyranthe*

Morphological characters

The mottled emigrant, *Catopsilia pyranthe* Linnaeus, 1758; is medium size butterfly, the color of this butterfly is mostly similar to the greenish white reach mostly to ground color. Therefore, underside covered with greenish in color having white spots encircled by ground color lines. The number of these spots make their underside brittle. The upper side is mostly white green in color, which having the black spots on fore wing. However, the hind and forewings of male and female is similar. The antennae are radish, while head and thorax were brown in color. Additionally, white hairs were found on their thoracic region. There abdomen and thoracic part white in color. Both of the sexes were same in color and shapes (Fig. 3).

a b

Fig. 2 The common or Lemon Emigrant, *Catopsilia ponoma*, Linnaeus, 1758; was collected for determination of biodiversity of Tehsil Tangi, KP, Pakistan during August 2014-May 2015; ventral side (a) and dorsal side (b); bar on the photographs indicate 10 mm.

a b

Fig. 3 The mottled emigrant, *Catopsilia pyranthe* Linnaeus, 1758; was collected for determination of biodiversity of Tehsil Tangi, KP, Pakistan during August 2014-May 2015; ventral side (a) and dorsal side (b); bar on the photographs indicate 10 mm.

3.3 Clouded yellow, *Colias fieldii*

Morphological characters

The clouded yellow, *Colias fieldii* Fabricius, 1807; is a medium size butterfly which are usually called clouded yellow. The measurement of their parts are body length, wingspan, antennae and legs. The morphology of this butterfly is like yellow gloom, carroty and snowy. Therefore, the wings of the species were usually black their limitations regions (frequently compact in males, regularly with whitish acnes in females). However, they roosts through extensions locked, while the upper side of this decoration can be sight dimly complete the wings during flight time. This butterfly are commonly found in the study area. They are live in pea plant especially (Fig. 4).

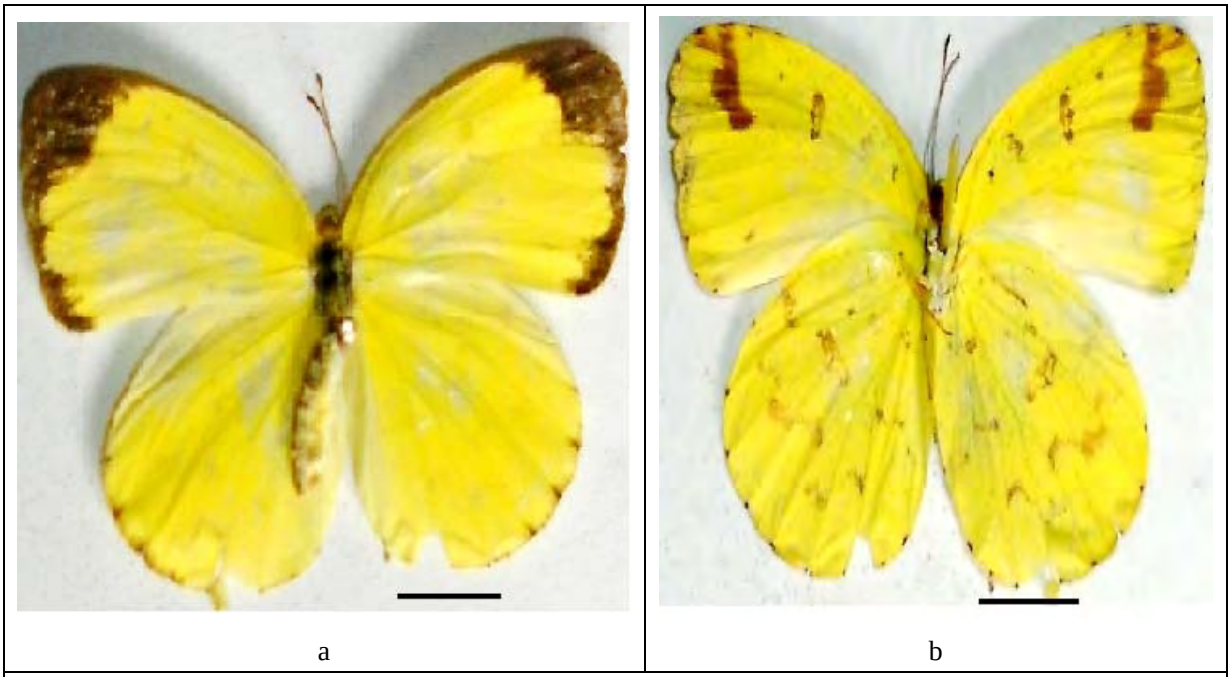
a b

Fig. 4 Theclouded yellow,*Colias fieldii* Fabricius, 1807; was collected for determination of Biodiversity of Tehsil Tangi, Khyber Pakhtunkhwa, Pakistan during August 2014-May 2015; ventral side (a) and dorsal side (b); bar on the photographs indicate 10 mm.

3.4 Common grass yellow, *Eurema hecabe*

Morphological characters

The common grass yellow, *Eurema hecabe* Linnaeus, 1758; is small size butterfly, all the body of the species were greenly lemon with black spots ventral side as well as dorsal side. Furthermore, hind wing and fore wing having black spots which make the beauty of the species. However, the terminal and apical limitations of wings are darkly brown margins. Mostly pale yellow color were found undersides of their body which makes them brown pattern, which were only present on the apex constituency. Where, the two small spots were embrace underside of the call. Disco-cellular part of the hind wings were kidney like in shape, it also covered with red ringed marks with curved line at post distal section. Both the sexes were similar in shapes and color. This is a common butterfly found everywhere around the world (Fig. 5).



a b

Fig. 5 The common grass yellow, *Eurema hecabe* Linnaeus, 1758; was collected for determination of biodiversity of Tehsil Tangi, KP, Pakistan during August 2014 to May 2015; ventral side (a) and dorsal side (b); bar on the photographs indicate 10 mm.

3.5 Eastern pale clouded yellow butterfly, *Colias erate*

Morphological characters

The eastern pale clouded yellow butterfly, *Colias erate* Esper, 1805; is medium size butterfly, the upper surface of hid and fore wing is cloudily yellow greenish with black spots. Moreover, on the hind wings apex with black in color. While the fore wing in underside having white spots. Bothe male and female similar (Fig. 6).

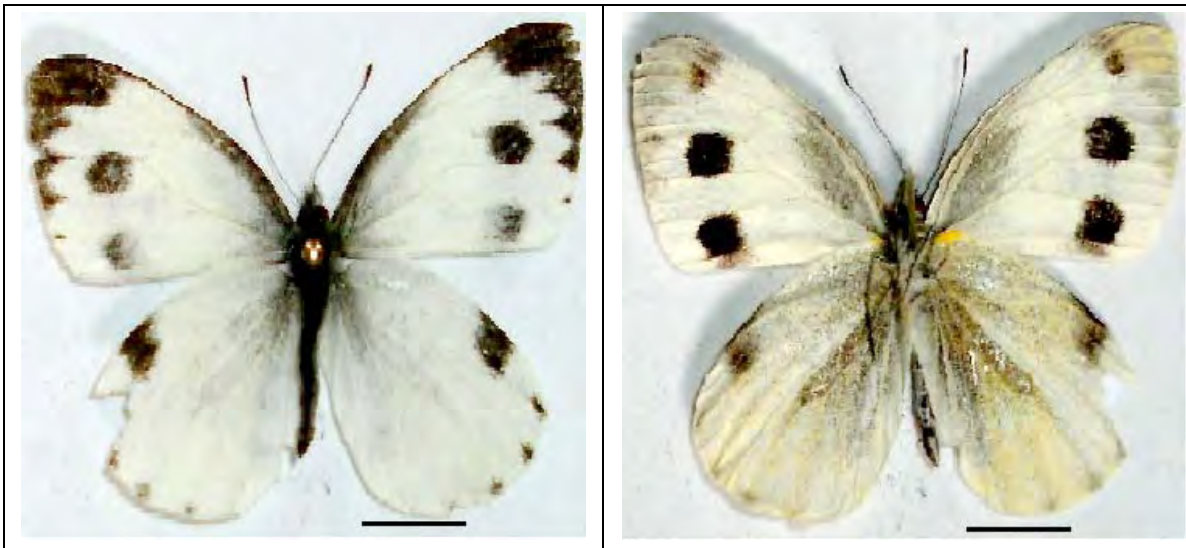
a b

Fig. 6 The eastern pale clouded yellow butterfly, *Colias erate* Esper, 1805;was collected for determination of biodiversity of Tehsil Tangi, KP, Pakistan during August 2014-May 2015; ventral side (a) and dorsal side (b); bar on the photographs indicate 10 mm.

3.6 Indian cabbage white, *Pieris canidia*

Morphological characters

The Indian cabbage white,*Pieris canidia* Linnaeus, 1768; is a medium size butterfly, the underside of the forewing having white, while the cells and costa lightly forced with black scales. However, the apex of the wings were approximately shaded with lightly yellow. The hindwing pale near to dark, while antennae mostly black with the white blotches, head, abdomen and thorax were abundant in long hairs, which are white in color (Fig. 7).



a b

Fig. 7 The Indian cabbage white, *Pieris canidia* Sparrman, 1768;was collected for determination of biodiversity of Tehsil Tangi, KP, Pakistan during August 2014-May 2015; ventral side (a) and dorsal side (b); bar on the photographs indicate 10 mm.

3.7 Small orange tip, *Colotisetrida*

Morphological characters

The small orange tip, *Colotis etrida* Boisduval, 1836;is a small size butterfly. Moreover, the hindwing is mostly unchanging, excepting the preapical dumpy verbose black line from the costal region, while some time they were absent, a sequence of black incurable dots were present in large in size. The cell and apex were sulphur yellow in colour with white spots underside of hindwings. Therefore, the ginger colour covering the superior sideways displays concluded by photograph. However, the forewings, are a slenderer carroty covering surrounded by black spots within the apical regions. Additionally, both of the sexes having white brownish, abdomen, head and thorax were black in colour. Moreover, the head and thorax were dompt small darkish brown hairs, while beneath the palpi, abdomen and thorax were white in colour (Fig. 8).

a b

Fig. 8 The small orange tip, *Colotis etrida* Boisduval, 1836;was collected for determination of biodiversity of Tehsil Tangi, KP, Pakistan during August 2014-May 2015; ventral side (a) and dorsal side (b); bar on the photographs indicate 10 mm.

3.8 Pioneer white butterfly, *Belonias aurota*

Morphological characters

The pioneer white butterfly, *Belonias aurota* Fabricius, 1793; is a medium size butterfly, the forewings having broad black apical area, the forewings having also five acnes, they were keen at the tip of wings, at the end of the marginal border enclosing rounder and narrower circular acnes. Both of the wing in upper side is white with black spots, while the underside of the hindwing is white black and white-yellow of forewing However, the apical area of female were supplementary approximately gloomy and snowy spots (Fig. 9).

a b

Fig. 9 The pioneer white butterfly, *Belonias aurota* Fabricius, 1793;was collected for determination of biodiversity of Tehsil Tangi, KP, Pakistan during August 2014-May 2015; ventral side (a) and dorsal side (b); bar on the photographs indicate 10 mm.

4 Discussion

The present survey was the 1st attempt to describe the characteristics of family Pieridae in Tehsil Tangi, Khyber Pakhtunkhwa, Pakistan. A total of 506 specimens were collected and preserved from 8 different study sites of Tehsil Tangi. Identification revealed that 8 different species in 6 genera belonging to family Pieridae present in this area.

Shah et al. (2001) made a survey of Kohat and collected 10 species belonging to only family Pieridae from 7 different localities over a period of 7 months. Therefore, both of the study area were show great similarities and having moderate temperature which help for the survival of butterflies.

Perveen and Ahmed (2012) surveyed the butterfly fauna of Kohat, Khyber Pakhtunkhwa, Pakistan.A total of 170 specimens were collected belonging to 13 species, falling in 10 genera and were identified belonging to 3 different families. *E. hecabe* was recorded from all 3 surveys whereas *P. ajaka* was recorded from the present. While the present study it was concluded that the duration of the both areas were mainly different which cause the dissimilarities of butterflies fauna.

Perveen and Haroon (2015) is also prepared the checklist of butterfly fauna of Tehsil Tangi, Khyber Pakhtunkhwa, Pakistan. Where they were collected a total of 506 species from the study area. However, from the present research the family Pieridae were present dominantly.

Martinez et al. (2003)examined the butterfly fauna of biodiversity and biogeography in Mexico. They were collected moreover, 1800 species of butterflies were documented, constituting about 10% of the butterfly fauna of the world. The 21 sites were acknowledged in Mexico for the abundance of butterfly fauna and comparisons were made between these sites. Although the present study were significantly different from the butterflies of Mexico. Where the climatic condition were colder than the present research of area.

Perveen et al. (2012) reported the characterization of butterflies and Perveen (2012) reported the distribution of butterflies of 5 sites of Kohat, Khyber Pakhtunkhwa, Pakistan. About 21 species of butterflies were documented. The collected species covered families Namphalidae, Papilionidae and Pieridae yielded 33, 10, and 57% butterfly diversity of the area, respectively. In contrast, only 10 species were recorded from the survey did by Perveen and Fazal (2013) In contrast, only 8 species were recorded from the present survey from Tehsil Tangi, therefore, both of the study areas were mainly different in species distribution. Because of the climatic conditions, where in Hazara University the climatic condition were mainly colder than the Tehsil Tangi.

However, Fitzherbert et al. (2006) studied that the diversity and distribution of butterflies in the context of ecological preference and altitude range. There 90 species were recorded between Gilgit and Khunjerab at high altitude. Some of them were highly distributed but other are less tolerant species present in colonies. Therefore, isolation plays a very important role in evolution of many species and ecological races. Species composition and abundance is always dependent upon maintenance of natural habitat. Another reason is shortage of time, i.e., survey was carried out only for 10 months. If survey was done for long time there would have been a substantial increase in number of butterflies. The present study is continuing for further butterflies finding in Tehsil Tangi.

5 Conclusion

It was concluded that from the present research that the genus *Catopsila*and *Colias* were dominant from Tehsil Tangi.

6 Recommendation

To explore the whole butterfly fauna of Charsadda, Khyber Pakhtunkhwa, Pakistan, further research is

recommended. However, the researchers and students should be expanded their cooperation and collaboration for the same.

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