

Article

Checklist of butterfly fauna of Kohat, Khyber Pakhtunkhwa, Pakistan

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Abstract

The butterflies play dual role, firstly as the pollinator, carries pollen from one flower to another and secondly their larvae act as the pest, injurious to various crops. Their 21 species were identified belonging to 3 different families from Kohat, Pakistan during September-December 2008. The reported families Namphalidae covered 33%, Papilionidae 10%, and Pieridae 57% biodiversity of butterflies of Kohat. In Namphalidae included: species belonging to subfamily Nymphalinae, Indian fritillary, *Argynnis hyperbius* Linnaeus; common castor, *Ariadne merione* (Cramer); painted lady, *Cynthia cardui* (Linnaeus); peacock pansy, *Junonia almanac* Linnaeus; blue pansy, *J. orithya* Linnaeus; common leopard, *Phalantha phalantha* (Drury); specie belonging to subfamily Satyrinae, white edged rock brown, *Hipparchia parisatis* (Kollar). In Papilionidae included: subfamily Papilioninae, lime butterfly, *Papilio demoleus* Linnaeus and common mormon, *Pa. polytes* Linnaeus. In Pieridae included: subfamily Coliaclinae, dark clouded yellow, *Colias croceus* (Geoffroy); subfamily Coliadinae, lemon emigrant, *Catopsilia pomona* Fabricius; little orange tip, *C. etrida* Boisduval; blue spot arab, *Colotis protractus* Butler; common grass yellow, *Eumera hecab* (Linnaeus); common brimstone, *Gonepteryx rhamni* (Linnaeus); yellow orange tip, *Ixias pyrene* Linnaeus; subfamily Pierinae, pioneer white butterfly, *Belenoi aurota* Bingham; Murree green-veined white, *Pieris ajaka* Moore; large cabbage white, *P. brassicae* Linnaeus; green-veined white, *P. napi* (Linnaeus); small cabbage white, *P. rapae* Linnaeus. The wingspan of collected butterflies, minimum was 25 mm of *C. etrida* which was the smallest butterfly, however, maximum was 100 mm of *P. demoleus* and *P. polytes* which were the largest butterflies. A detail study is required for further exploration of butterflies' fauna of Kohat.

Keywords butterflies; Kohat; Namphalidae; Papilionidae; Pieridae; wingspans.

1 Introduction

Of the 1.4 million species on earth, over 53% are insects, while about 15,000-16,000 species of butterflies are known worldwide (Hassan, 1994). More than 5,000 species of insects including 400 species of butterflies and moths have been reported from Pakistan (Khan et al., 2000; Khan et al., 2007). Butterflies have been regarded as the symbol of beauty and grace (Rafi et al., 2000). They are the best known insects due to their diurnal habitats and readily recognized by their bright colours, marvelous shapes and graceful flight give pleasure to everyone (Javaid, 1978). They are beneficial as pollinator, environmental indicator and have great aesthetic and commercial values (Ahsan and Javaid, 1975).

However, some biologists have made efforts to identify butterfly species, distribution and status. Pakistan Museum of Natural History (PMNH) and Oxford University Museum (OUM) have been studied insect

diversity from Gilgit along Karakoram Highway to the Sino-Pakistan border at Khunjerab pass and several selected valleys (Khan et al., 2000 and 2004). By 1999, they had recorded about 100 species of butterflies, with new Texas. For example about 40 species of butterflies were recorded in Hunza during 2000 expeditions. Another document was reported on butterfly diversity in Skardu, Shigar, Karmang, Sadpara, Kachura and Deosai plains (Abbas et al., 2002).

Animal coloration strategies have long been a topic of interest to naturalist and philosophers, and even featured prominently in Aristotle *Historian Animalia*, written more than 2000 years ago. In nature, there is much beautiful color on the wings of butterflies. Scientists are still baffled about exactly, how these colors are created. The diversity of colors and patterns on the wings of butterflies has caught the attention of evolutionary biologists for more than a century (Lennox and Aristotle, 2001). They are very sensitive to habitation degradation but also have a much more rapid passage of generation than higher vertebrates and hence can be quicker to react to small changes in their environment than those of other animals (Gardiner et al., 2005).

The Kohat lies between 33°-04' and 33°-34' north latitudes and 70°-29' and 72°-01' east longitudes. It is bounded on the north by Peshawar and Nowshera districts, respectively, on the east by Attock, the south by Mianwali of the Punjab province and Karak district and on the west by Hangu district and Orakzai agency of FATA. The total area of the district is 2545 km². The Kohat valley is the most important agriculturally rich area. Generally, the district is elevated and attained only inconsiderable heights above the plain area. The headquarter town of Kohat is more than 550 m above the sea level (Schmitt and Rakosy, 2007). Its climate is hot from May to September with the hottest in June. Minimum and maximum temperature recorded during June is about 27 °C and 45 °C, respectively. A pleasant change in the weather is noted from October onwards up till February. The winter is cold and severe with minimum and maximum temperature recorded during January about 2 °C and 6 °C, respectively. The rainfall is throughout the year and the monsoon rain from May to October. August is the rainiest month with an average of about 111 mm. The average annual rainfall is about 546 mm. The maximum humidity has been recorded in August during summer and in December during winter (Shah et al., 2001). The common trees are *ber*, gurgulla, sanatha, phulal, olea etc. All kind of roses, bougainvillea, kashmalo, gul-e-nargis, gui-e-dawoodi and other seasonal flowers are planted. Common wild life found is hare, jackal, wolf, fox, wild cat, chakor, black partridge, grey partridge, urial, chinkara, blue bull, hogdeer, water fowl, see-see etc. The major crops grown in the district are wheat, maize, chari and sugarcane. The objective of present research is to identify the butterflies' fauna of Kohat for awareness and education.

2 Materials and Methods

Butterflies of different species were caught by the insect collecting net during September-December 2008 from 5 sites of Kohat region, i.e., the university campus, Thanda Dame, Company Bagh, KDA Park and Dodo Park. Each site was sampled after an interval of 3 days using an insect net. For killing, they have been put in the cyanide bottle. Then they were placed on a board for stretching their wings to measure their wingspan and inserted the insect pin into their thoracic region. When their wings dried, they were arranged in the wooden box, in different rows with the phenolphthalein balls for the protection from pests. They were identified with help of already preserved specimen, internet, literature available (Sabir et al., 2000; Munir et al., 2007), keys (Abbas et al., 2002; Munir et al., 2007) and entomologists on the bases of their colors and spots which are present on their wings upper and lower side. All specimens were then properly labeled. The literature about these species of butterflies was also collected.

3 Results

During the present survey, twenty (21) spp. were identified belonging to three different families including Nymphalidae with 7, Papilionidae with 2 and Pieridae with 12 spp. were reported as follows:

Phylum: Arthropoda

Class: Insecta

Order: Lepidoptera

Family: Nymphalidae

Subfamily: Nymphalinae

Indian fritillary, *Argynnis hyperbius* (Linnaeus 1763)

Common castor, *Ariadne merione* (Cramer 1777)

Painted lady, *Cynthia cardui* (Linnaeus 1758)

Peacock pansy, *Junonia almanac* (Linnaeus 1758)

Blue pansy, *J. orithya* Linnaeus 1758

Common leopard, *Phalantha phalantha* (Drury 1773)

Subfamily: Satyrinae

White edged rock brown, *Hipparchia parisatis* (Kollar 1849)

Family: Papilionidae

Subfamily: Papilioninae

Lime butterfly, *Papilio demoleus* Linnaeus 1758

Common mormon, *Pa. polytes* Linnaeus 1758

Family: Pieridae

Subfamily: Coliaclinae

Dark clouded yellow, *Colias croceus* (Geoffroy 1785)

Subfamily: Coliadinae

Lemon emigrant, *Catopsilia pomona* Fabricius 1775

Little orange tip, *Colotis etrida* Boisduval 1836

Blue spot arab, *C. protractus* Butler 1876

Common grass yellow, *Eumera hecab* (Linnaeus 1758)

Common brimstone, *Gonepteryx rhamni* (Linnaeus 1758)

Yellow orange tip, *Ixias pyrene* Linnaeus 1764

Subfamily: Pierinae

Pioneer White butterfly, *Belenoi aurota* Bingham 1907

Large cabbage white, *Pieris brassicae* Linnaeus 1758

Murree green-veined white, *P. ajaka* Moore 1865

Green-veined white, *P. napi* (Linnaeus 1758)

Small cabbage white, *P. rapae* Linnaeus 1758

4 Discussion

The present study was the second attempt to collect butterfly fauna of Kohat. Merckx and Vansdyck (2005) stated that nectar of butterfly-pollinated flowers contained generally higher levels of amino acids than flowers pollinated by other animal.

Shah et al. (2001) made a survey of Kohat and collected 10 species belonging to only family Pieridae from seven different localities over a period of 7 months during 1999. The present survey was made in the

same district and a total 21 species of butterflies were collected in which 21 species belonging to 3 different families from 5 different localities over a period of 4 months during 2008. The pioneer butterfly, *Anaphacis aurota* F.; African clouded yellow, *Colias electo* (Linnaeus); Eastern pale clouded yellow, *Colias erata* (Esper); Indian cabbage white, *P. canidia* (Linnaeus) and bath white, *Pontia daplidice* Linnaeus were reported previously while not found presently. However, *Catopsilia pomona*, *Colias croceus*, *Colotis protractus*, *Ixias pyrene*, *P. ajaka*, *P. napi* and *Belenoi aurota* were reported presently while not found previously. This difference may be due to the weather during collection periods or collection error.

Parchem et al. (2007) stated that evolution of wings and adaptive properties of butterflies were made them as a successful group on earth. The diversity of their shape, size and color patterns is a direct reflection of the important role and wings have played in the radiation of insects. Therefore, during the present study wingspan of collected species has been studied. It was found that maximum wingspan was found in *Pa. polytes* (90–100 mm) and minimum was of *Colotis etrida* (25–45 mm).

Verma et al. (2004) studied the genera of butterflies occurring in Pakistan, India, Sarilanka, Nepal, Bhotan, Bangladesh and Myanmar. They reviewed and cited many taxonomical papers. Their index showed valid name of genus and species of butterflies from India region. They reported 15 genera of Papilionidae, 25 Pieridae, 6 Danaidae of the same country. The present research was conducted to determine butterfly fauna of Kohat region. Twenty (21) species were identified during the survey belonging to 3 families including 7 species of family Namphalidae, 2 of Papilionidae and 12 of Pieridae. Both studies were conducted in two different countries. The present study was restricted to a small area and collecting period was also short.

Van-Lien and Yuan (2003) conducted their survey on the species composition, richness and abundance of Papilionoidea (excluding Lycaenidae) butterfly fauna in different habitats with various degrees of disturbance and altitudes in tropical forests at the Tam Dao National Park, the northern Vietnam in 2001. The results showed significant differences of butterfly diversity among the different habitat types and between the low and high altitude sites. The butterfly diversity, species richness and species abundance in the low elevation habitats were higher than in the high elevation habitats. The highest diversity of butterflies occurred in the mixed habitats of agriculture, scrub and clearing. During the present research, the survey was conducted in Kohat which is located between 33°-04' and 33°-34' north latitudes and 70°-29' and 72°-01' east longitudes. Majority of butterfly species collected were belonging to families Pieridae and Namphalidae and only 2 species was belonging to the family Papilionidae. It is expected, if collection should be made in more time and larger area great biodiversity would be observed.

Sharma et al. (2006) studied the collection of butterflies from Punjab new campus area from June to September study was based on the relationship of temperature, humidity and population of butterflies the occurrence of butterflies was more in moderate temperature but in June and September there were decline. Relationship between temperature and population of butterflies was positive. However, Fitzherbert et al. (2006) studied the diversity and the distribution of butterflies in the context of ecological preference and altitude range, 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. So isolation plays a very important role in evolution of many species and ecological races. In the future, further research should be conducted with respect to the mention factors in Kohat.

5 Conclusion

During the present research, a total 21 species belonging 15 genera and 3 families were reported from 5 different localities over a period of 4 months during 2008. The families with ascending orders were: 12 species belonging to family Pieridae with 3 subfamilies > 7 species belonging to family Namphalidae with 2

subfamilies > 2 species belonging to family Papilionidae with 1 subfamily. Among the collected butterflies, the smallest one with the smallest wingspan was the *C. etrida* belonging to the family Pieridae and the largest with the largest wingspan were two, i.e., *P. demoleus* and *P. polytes* both belonging to the family Papilionidae.

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