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An annotated list of the butterfly fauna of Quetta, Pakistan

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Abstract

A field survey was conducted to document the latest diversity of butterfly fauna that inhabits the Quetta region from April to October, 2012. A total of 240 individuals represented by 23 species of butterflies was recorded. The family Pieridae dominated with seven species followed by Nymphalidae (six species) and Lycaenidae (six species), Hesperioidea (three species) and Papilionidae (one species). *Pieris rapae* and *Belenois aurota* represented the most abundant species, each with 29 individuals encountered. Papilionid butterflies were rarely encountered with only one species, *Papilio machaon* (Common Yellow Swallowtail) represented by two individuals. *Cynthia cardui*, a migrant butterfly which is widely distributed throughout Pakistan was also recorded in Quetta. This study provides a first attempt in documenting the butterfly fauna of Quetta region.

Keywords: Rhopalocera; taxonomy; diversity; Hazarganji-Chiltan National Park; Balochistan.

1. Introduction

Butterflies and moths, together form the second largest order of insects comprising more than 174,250 species so far identified [1]. The most attractive insects of this order are butterflies, hawk moths, and emperor moths [2]. Order Lepidoptera is chiefly divided into the suborder Heterocera (moths) and Rhopalocera (butterflies) [3]. Rhopalocera is further classified into two superfamilies Papilionoidea and Hesperioidea [4] and amongst the identified species more than 400 species of butterflies have been reported from Pakistan [5]. Prior to 1947, butterflies and moths of the Indo-Pak subcontinent were studied by various researchers but in the more recent decades very few studies have been reported about the enriched fauna of Lepidoptera in Pakistan. The first ever preliminary report on butterflies of Rawalpindi and Islamabad was conducted [7]. Khan *et al.* [5, 6] studied the distribution and diversity of Papilionidae from Rawalpindi and Islamabad and butterfly diversity of Muzafarabad and Kotli District of Azad Kashmir, respectively. The butterfly of Skardu region was documented by Abbas *et al.* [8]. Recently the butterfly fauna of Kohat region were reported [9] and latest checklist of butterflies of Sindh was compiled [10]. So far no work has been done on the Lepidopteran fauna of Balochistan which is the largest province of Pakistan. Except for Evans [3] but as mentioned, it was earlier before independence of Pakistan. The aim of this study was to document the latest diversity of butterfly fauna that inhabits the Quetta region.

2. Materials and methods

Study Site: The present study was conducted in Quetta, North-Western part of the province (Balochistan). Two study sites were selected which included Hazarganji-Chiltan National Park (30° 13' 22.5624" N, 66° 44' 11.7024" E) and Omagh Park (30° 10' 57.0216" N, 66° 56' 15.8748" E). Both of the study sites are almost 20 km apart from each other and more or less located at a distance of 25 km from the Quetta city. The applicable entrance permit for Hazarganji-Chiltan National Park was obtained from Provincial Forestry Department of Quetta, Balochistan whereas the entrance Omagh Park is free for public. Both of the parks are more or less arid rock mountain areas.

Data Collection: Butterflies were collected daily, from 0830 to 1400 hours using aerial nets and hand picking. The specimens were immediately killed by pressing their thorax carefully to minimize the damages of external organs and were kept in paper envelopes. The specimens were then brought to the laboratory and placed on a spreading board to stretch their wings and

were pinned in the thorax. All the specimens were then allowed to dry and were preserved in entomological boxes, arranged in rows and with phenolphthalein balls to avoid destruction of specimens from pests. Identification of the species was made by using identification keys of order Lepidoptera [3, 12 & 13]. After identification the specimens were labeled properly along with voucher number and were deposited in the Department of Zoology, S.B.K Women University Quetta, for insect collector reference. All the species were classified following that of [4] into two superfamilies and arranged into a table accordingly.

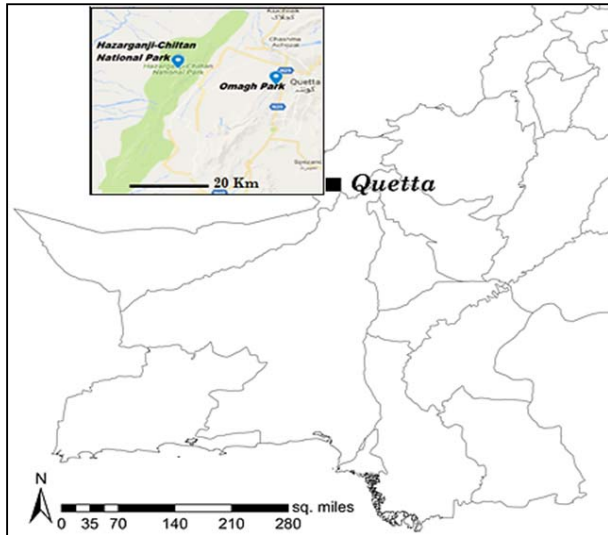


Fig : Map of Quetta, Balochistan, whereas the square area shows insight the location of Hazarganji-Chiltan National Park and Omagh Park. (Scale bar is mentioned for the insight map and main map; source: ArcGIS and Google maps).

3. Results and Discussion

The present study was conducted in Quetta from April to October 2012. As butterflies collect nectar moving from plant to plant, their diversity and abundance is highly correlated with the food plants in their surroundings [11]. The most common local flowering plants found in study sites included *Anthemus sp.*, *Astragalus sp.*, *Carthamus sp.*, *Aenthurea iberica*, *Trev.ex spreng*, *Polygala dictyoptera boiss*, *Pulicaria sp.*, *Perovskia abrotanoides karel*, *Senecio*, *Taraxicum officinale*. A large number of butterflies were encountered around these plants.

A total of 240 individuals was collected, which were assembled into five families and 23 individual species. After the collection and identification the data was arranged as follows:

Order: Lepidoptera

Suborder: Rhopalocera

1. Superfamily: Papilionoidea (True Butterflies)
2. Superfamily: Hesperioidea (Skipper-Butterflies)

3.1: Family: Pieridae

3.1.1. Subfamily: Pierinae

Genus: *Belenois* (Hubner, 1819)

Belenois aurota -Fabricius, 1793 (Pioneer White Butterfly)

Genus: *Colotis* (Hubner, 1819)

Colotis fausta -Olivier, 1804 (Large Solomon Arab)

Genus: *Pieris* (Schrank, 1801)

Pieris rapae -Linnaeus, 1758 (Cabbage White Butterfly)

Pieris brassicae -Linnaeus, 1758 (Large white)

3.1.2. Subfamily: Coliadinae (Swainson, 1827)

Genus: *Colias* (Fabricius, 1807)

Colias erate -Esper, 1805 (Eastern Pale Clouded Yellow)

Colias croceus -Geoffroy, 1785 (Dark Clouded Yellow)

Genus: *Catopsilia* (Hubner, 1819)

Catopsilia pomona -Fabricius, 1775 (Lemon Migrant Cassia)

3.2: Family: Nymphalidae

3.2.1: Subfamily: Danainae

Genus: *Danaus* (Kluk, 1802)

Danaus chrysippus -Linnaeus, 1758 (Plain Tiger)

3.2.2: Subfamily: Nymphalinae

Genus: *Cynthia* (Fabricius, 1807)

Cynthia cardui -Fabricius, 1807 (Painted Lady)

3.2.3. Subfamily: Satyrinae

Genus: *Hipparchia* (Fabricius, 1807)

Hipparchia parisatis -Kollar, 1849 (White Edged-Rock Brown)

Genus: *Pseudochazara* (de Lesse, 1951)

Pseudochazara panjshria -Omoto, 1966 (Afghani Tawny Rock Brown)

Pseudochazara kanishka -Asseum, 1980 (Asseum's Tawny Rock Brown)

Pseudochazara thelepassa -Geyer, 1827 (Baluchi Rock Brown)

3.3: Family: Lycaenidae

3.3.1: Subfamily: Lycaeinae

Genus: *Aricia* (Reichenbach, 1817)

Aricia agestis -Denis & Schiffermuller, 1775 (Brown Argus)

Genus: *Lycaena* (Fabricius, 1807)

Lycaena phlaeas -Linnaeus, 1761 (Small Copper)

3.3.2: Subfamily: Polyommattinae

Genus: *Polyommatus* (Latreille, 1804)

Polyommatus icarus -Rottenburg, 1775 (Common Blue)

Genus: *Catochrysops* (Biosduval, 1832)

Catochrysops strabo -Fabricius, 1793 (Forget-Me-Not)

Genus: *Azanus* (Moore, 1881)

Azanus uranus -Butler, 1886 (Dull Babul Blue)

Genus: *Zizeeria* (Chapman, 1910)

Zizeeria kassandra -Moore, 1865 (Dark grass blue)

3.4: Family: Papilionidae

3.4.1: Subfamily: Papilioninae

Genus: *Papilio* (Linnaeus, 1758)

Papilio machaon -Linnaeus, 1758 (Common yellow swallowtail)

4. Superfamily Hesperioidea (Skipper Butterflies)

4.1: Family: Hesperiidae

4.1.1. Subfamily: Hesperinae

Genus: *Pelopidas* (F. Walker, 1870)

Pelopidas mathias -Fabricius, 1798 (Small Branded Swift)

Genus: *Cymaenes* (Scudder, 1872)
Cymaenes trebius -Mabille, 1891 (Fawn Spotted Skipper)

Genus: *Carcharodus* (Hubner, 1819)
Carcharodus dravira -Moore, 1874 (Marbled Skipper)

5. Discussion

Evans^[3] deliberated the details of species recorded together from Balochistan and Sindh as four Papilionids, 24 Pierids, three Danaids, 13 Satyrids, four Nymphalids, 20 Lycaenids and 12 Hesperiids.

1. *Belenois aurota* -Fabricius, 1793 (Pioneer white butterfly)

Habitat and Distribution: The Pioneer White Butterfly (Fig.1; a1 & a2) inhabits a broad range of Sri Lanka, Himalayas, Kashmir to Sikkim, to the west it spreads through Persia, Arabia and East of Africa^[13]. Its presence has been reported from Kohat and Sindh, Pakistan^[9, 10].

2. *Colotis fausta* -Olivier, 1804 (Large Solomon Arab)

Habitat and Distribution: *Colotis fausta* (Fig. 1b) widely occurs in Balochistan, Sindh, Punjab, Persia and Afghanistan, as well as reported from Rajasthan and Bombay^[13].

Some specimens from the desert areas are paler than the individuals from areas with heavy rainfall.

Remarks: The male and female of *Belenois aurota* are dimorphic and easily distinguishable. The Pioneer White Butterflies of both sexes were the most abundant species encountered in this study.

3. *Pieris rapae* -Linnaeus, 1758 (Cabbage White Butterfly)

Habitat and Distribution: The Cabbage White Butterfly (Fig. 1f) broadly inhabits the ranges of Europe and Western Asia. In Pakistan the Cabbage White Butterfly has been recorded from N.W. Himalayas, Chitral, Kashmir^[13], in Quetta and Murree^[3], from Skardu^[8], Sindh^[10] from Kohat^[9].

With its wide range of distribution and host-plant affiliation, this species is easily recognizable and the most abundant species collected in our study.

4. *Pieris brassicae* -Linnaeus, 1758 (Large White)

Habitat and Distribution: The Large White Butterfly (Fig. 1g) inhabits Europe, Northern and Central Asia, Himalayas, from Chitral to Bhutan and N.W. of India^[13]. *Pieris brassicae* is reported by a number of authors from Skardu, Kohat, Rawalpindi & Islamabad and Sindh, Pakistan^[8, 9, & 10] respectively. We found this species quite abundant from Quetta.

5. *Colias erate* -Esper, 1805 (Eastern Pale Clouded Yellow)

Habitat and Distribution: The Eastern Pale Clouded Yellow (Fig. 1d) reported from Karachi^[10]. Now it has been known from various other areas of Northern Pakistan, as well^[8]. However,^[9] did not encounter this species from Kohat region.

Remarks: The Eastern Pale Clouded Yellow is described as highly polymorphic species and sometimes it is difficult for researchers to differentiate this species from the other similar-appearing species.

6. *Catopsilia pomona* -Fabricius, 1775 (Lemon Migrant Cassia)

Habitat and Distribution: The Lemon Migrant Cassia (Fig.

1e) is distributed throughout Siam, China and the Malayan Sub-region towards Australia^[13]. Deliberating its presence from Pakistan in Kohat, Dir Upper and Sindh regions^[9, 15 & 10].

Remarks: *Catopsilia pomona* has a chalky-white wing with more or less broad and clearly visible and defined sulphur yellow areas making it impossible to pass by unnoticed.

7. *Danaus chrysippus* -Linnaeus, 1758 (Plain Tiger)

Habitat and Distribution: The Plain Tiger (Fig. 1i) is widely distributed in S. Europe, Syria, over a great part of Ethiopian region, through Arabia, Persia and Afghanistan and extending its range eastwards to China and Malayan sub-region to Sulu. It occurs sporadically within the Indo-Pak subcontinent deliberating its abundance in Karachi^[13]. However,^[8 & 9] did not mention *D. chrysippus* from the Northern part of Pakistan. While,^[10] documented three other species of *Danaus* excluding for the Plain Tiger.

Remarks: The forewing of *Danaus chrysippus* is tawny dark towards its costal margin, having one large white patch near the apex with a series of white spots varying in size, arranged towards the terminal.

8. *Cynthia cardui* -Fabricius, 1807 (Painted Lady)

Habitat and Distribution: The Painted Lady (Fig. 1h) is widely distributed throughout Pakistan, reported predominantly from the Northern areas and Chitral^[3, 8 & 9], Lahore^[16] and Sindh^[10]. It is a frequent visitor of fields and meadows around settlements and in Pakistan, this species is associated with almost 21 genera of host-plants^[8].

9. *Hipparchia parisatis* -Kollar, 1849 (White Edged-Rock Brown)

Habitat and Distribution: The White Edged-Rock Brown (Fig. 1j) is widely distributed throughout N.W. Himalayas, Balochistan extending towards Afghanistan and S. Persia^[12].

10. *Pseudochazara thelepassa* -Geyer, 1827 (Baluchi Rock Brown) (Fig. 1k)

11. *Pseudochazara panjshria* -Omoto, 1966 (Afghani Tawny Rock Brown) (Fig. 2l)

12. *Pseudochazara kanishka* -Asseum, 1980 (Asseum's Tawny Rock Brown) (Fig. 2m)

Habitat and Distribution: Abundantly present throughout S. Russia, Persia to Afghanistan and also recorded from Quetta, Balochistan. *P. thelepassa* has sometimes been mistaken with *Satyrus lehana* because of its wing coloration and appearance^[12].

13. *Aricia agestis* -Denis & Schiffermuller, 1775 (Brown Argus)

Habitat and Distribution: The Brown Argus (Fig. 2n) ranges from Palearctic region except for polar areas. Inhabits the areas of Himalayas, Chitral, Kashmir, Simla to Kwaon and Balochistan^[13]. Reported from Skardu^[8], while^[9 & 10] did not document the Brown Argus in their studies.

Remarks: Males and females are very difficult to distinguish based on their wing coloration.

14. *Lycaena phlaeas* -Linnaeus, 1761 (Small Copper)

Habitat and Distribution: The Small Copper (Fig. 2r) is widespread and common across Europe, Asia, and North America, and also found in North Africa, south through to

Ethiopia. It can be found almost anywhere in south/central England and Wales although, it seems to become more patchy in northern England, Scotland and Ireland [17], [8] Documented its presence from Skardu city, Kachura and Sadpara. We recorded this species, 12 individuals both male and female from Quetta.

15. *Polyommatus icarus* -Rottenburg, 1775 (Common Blue)

Habitat and Distribution: The Common Blue (Fig. 2s) is broadly distributed in the areas of the Palearctic Region (except for the Polar areas) Himalayas, Chitral and Ladakh. Baluchistan is considered amongst one of the well-known areas for the occurrence of *Polyommatus icarus* from Pakistan [13].

Remarks: The species has been recorded from Quetta and Chitral. The wings are ground-colour on the upper side and were paler purplish.

16. *Catochrysops strabo* -Fabricius, 1793 (Forget-me-not)

Habitat and Distribution: The *Catochrysops strabo* (Fig. 2q) occurs widely across Peninsular India south of the Himalayas, Ceylon, Assam, Burma, Tenasserim, Andamaus, Kicobars and extending through the Malayan sub-region down to Australia. Forget-Me-Not has been reported from Sindh [10] while there is no other documentation from Northern Pakistan.

17. *Azanus uranus* -Butler, 1886 (Dull Babul Blue)

Habitat and Distribution: The Dull Babul Blue (Fig. 2p) ranges from Baluchistan, Punjab, Karachi, Oudh, Kumaon, Sikhim, Bengal, Central and Southern India [13], [10] Reported three species of genus *Azanus*, however we captured only one species of this genus.

Remarks: The black tornal spot is dominant on the hind wing of both sexes and this species is very close in appearance to *Azanus ubdalus*.

18. *Zizeeria kasandra* -Moore, 1865 (Dark Grass Blue)

Habitat and Distribution: *Zizeeria kasandra* (Fig. 2o) is distributed all over Southern Europe, Africa, Central and Western Asia particularly Peninsular India south of the outer Himalayan, Kauge, Ceylon, Assam, Burma, Tenasserim, Kicobars, extending through the Malayan sub-region to Australia. It has also been recorded from Madagascar and the Mauritius [13]. The Dark Grass Blue has been reported [10] from Sindh. However, not documented by other authors from Pakistan in recent studies.

Remarks: There is quite a variance observed amongst the specimens of dry and wet areas in both male and female

individuals.

19. *Papilio machaon* -Linnaeus, 1758 (Common Yellow Swallowtail)

Habitat and Distribution: The Common Yellow Swallowtail (Fig. 2t) was reported [3, 12] from Chitral to Nepal extends to Central Asia, N.W of Southern Europe and North Africa. It was reported from Balochistan, [17, 18] documented this species from Rawalpindi and Islamabad. However, *Papilio machaon* was not encountered by [9 & 10] in their recent studies from Kohat and Sindh, respectively. While *Papilio machaon* was the least encountered species from our study with only two individuals recorded.

Remarks: The 4th vein of the hind wing of Common Yellow Swallowtail, produces a slender tail and collapse along the margin.

20. *Pelopidas mathias* -Fabricius, 1798 (Small Branded Swift)

Habitat and Distribution: This Panpalaeotropical skipper (Fig. 2w) is more widely distributed in the Oriental region than the previous, but on the other hand, it does not penetrate to the Mediterranean and temperate Middle East [19]. While, reported by [10] from Sindh, we also encountered nine individuals similar to *C. trebius*, however we had not confirmed their identification.

21. *Cymaenes trebius* -Mabille, 1891 (Fawn Spotted Skipper)

Habitat and Distribution: *Cymaenes trebius* (Fig. 2v) usually occurs in Argentina, Costa Rica, Guatemala, Honduras, Mexico, Nicaragua, Panama, and United States [20]. We collected eight individuals of this species but not confirmed about the taxonomy.

22. *Carcharodus dravira* -Moore, 1874 (Marbled Skipper)

Habitat and Distribution: The Marbled Skipper (Fig. 2u) is distributed widely over Central Asia including; Iran, Afghanistan, Turkmenistan, Kashmir, Uzbekistan, Tadjikistan, Kyrghizstan. Mountain species are paler than the meadows and garden species [21]. We collected ten individuals of this species while, [10] mentioned the African Marbled Skipper in his studies.

Quetta is famous for its agriculture produce, most notably fruit orchards and is sparsely covered with vegetation also known as the Fruit Garden of Pakistan. A variety of lepidopteran species are found in the hills and areas surrounding the hills. Quetta as a biosphere reserve, offers the best ecological habitat for the taxonomy and distribution of Lepidoptera. While Hazarganji National Park, about 20km Southwest of Quetta city harbors the endangered Markhor species.



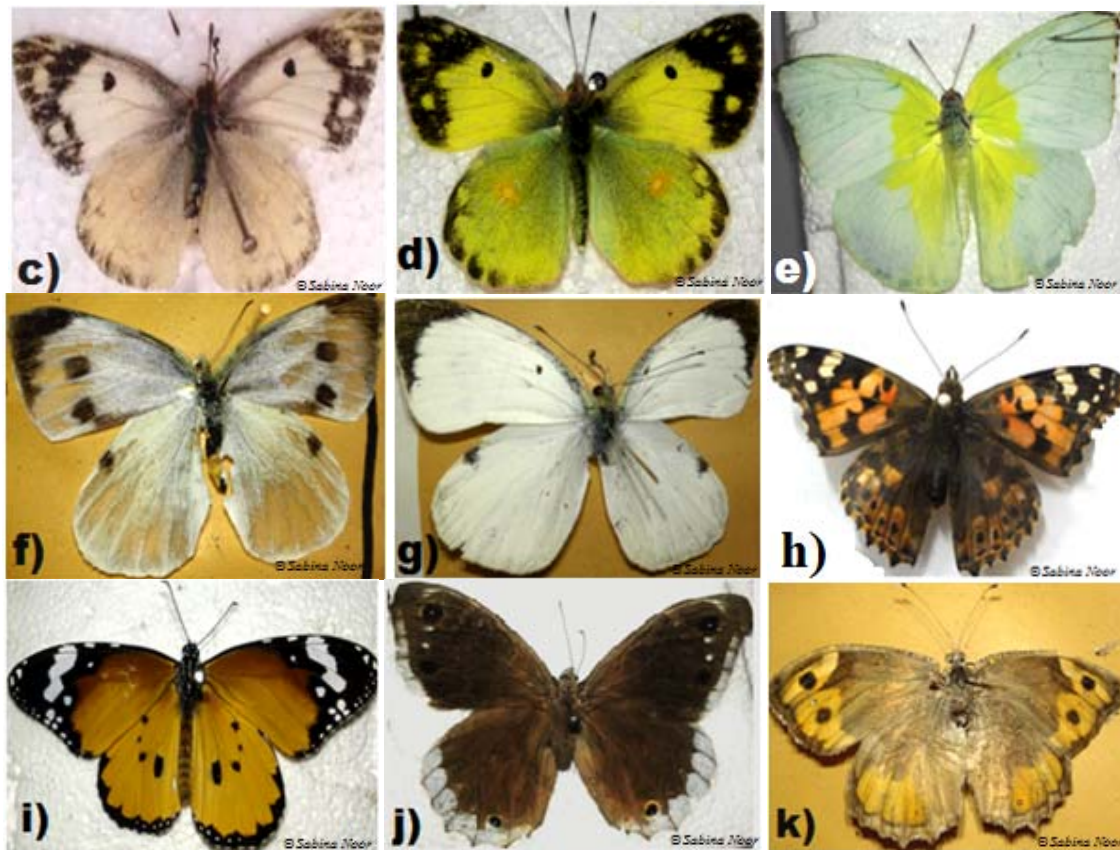


Fig 1; a1 & a2: *Belenois aurota* ♂, ♀; b: *Colotis fausta*; c: *Colias croceus*; d: *Colias erate*; e: *Catopsilia pomona*; f: *Pieris rapae*; g: *Pieris brassicae*; h: *Cynthia cardui*; i: *Danaus chrysippus*; j: *Hipparchia parisatis*; k: *Pseudochazara thelepasa*.

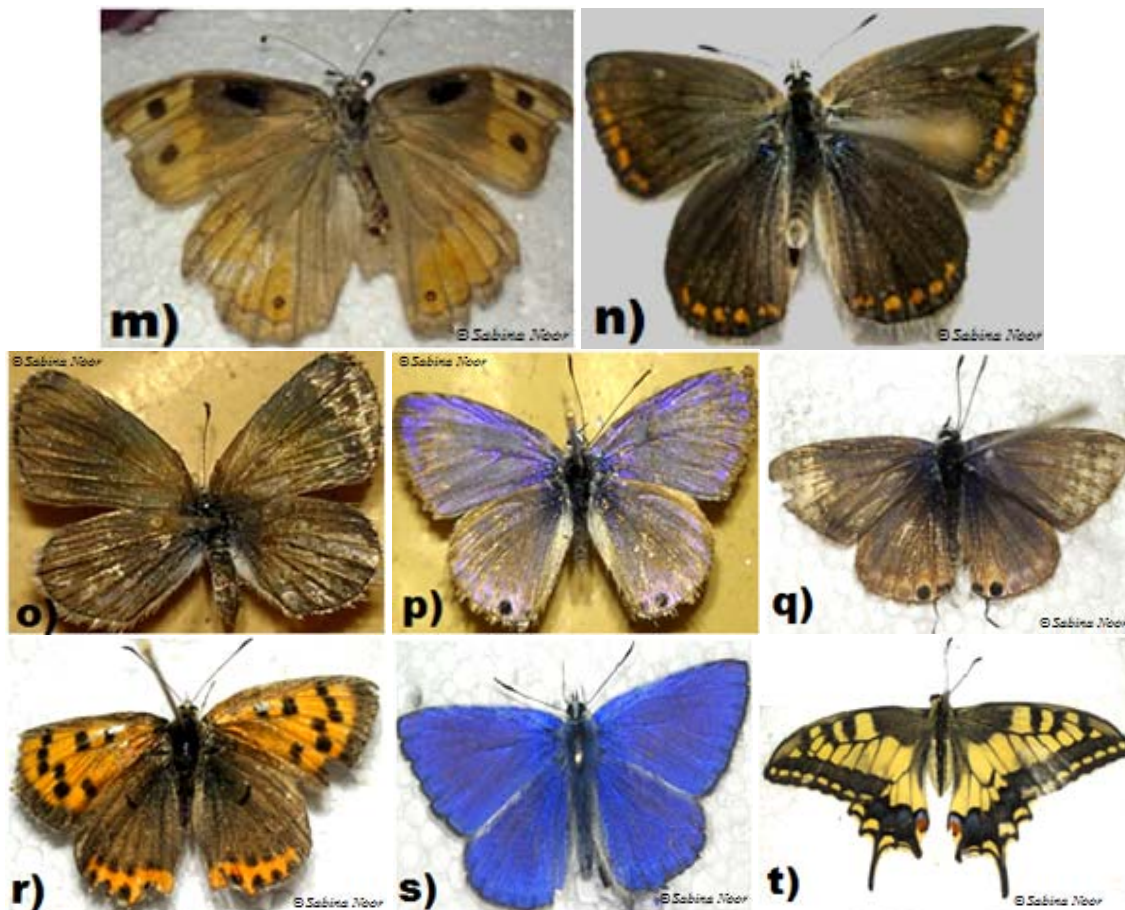




Fig 2; l: *Pseudochazara panjshria*; m: *Pseudochazara kanishka*; n: *Aricia agestis*; o: *Zizeeria karsendra*; p: *Azanus uranus*; q: *Catochrysops strabo*; r: *Lycaena phlaeas*; s: *Polyommatus icarus*; t: *Papilio machaon*; u: *Carcharodus dravira*; v: *Cymaenes trebius*; w: *Pelopidas mathias* (Photos by; Sabina Noor).

Table 1: List of butterflies collected from different areas of Quetta city with their frequency.

Family	Subfamily	Species	Common name	No. of individuals
Pieridae	Pierinae	<i>Belenois aurota</i> (♂)	Pioneer white	8
	Pierinae	<i>Belenois aurota</i> (♀)	Pioneer white	21
	Pierinae	<i>Colotis fausta</i>	Large Salmon Arab	4
	Coliadinae	<i>Colias philodice</i>	Clouded sulphur	11
	Coliadinae	<i>Colias erate</i>	Eastern pale clouded yellow	15
	Coliadinae	<i>Catopsilia pomona</i>	Lemon migrant cassia	5
	Pierinae	<i>Pieris rapae</i>	Cabbage white butterfly	29
1. Nymphalidae	Pierinae	<i>Pieris brassicae</i>	Large white butterfly	17
	Nymphalinae	<i>Cynthia cardui</i>	Painted lady	14
	Danainae	<i>Dannus chrysippus</i>	Plain tiger	3
	Styrinae	<i>Hipparchia parisiatis</i>	White edged rock brown	7
	Styrinae	<i>Pseudochazara alpine</i>		8
	Styrinae	<i>Pseudochazara panjshria</i>	Afghani tawny rock brown	6
2. Lyceanidae	Styrinae	<i>Pseudochazara kanishka</i>	Aussem's tawny rock brown	13
	Lycaeinae	<i>Aricia agestis</i>	Brown Argustus	9
	Polyommatinae	<i>Cupido minimus</i>	Small blue	5
	Polyommatinae	<i>Hemiargus isola</i>	Reakirt's blue	7
	Polyommatinae	<i>Lampides beoticus</i>	The pea blue	13
	Lycaeinae	<i>Lycaena phlaeas arctodon</i>	Flame copper/ Small copper	12
3. Papilionidae	Lycaeinae	<i>Polyommatus icarus</i>	Common blue	4
	Papilioninae	<i>Papilio machaon</i>	Common yellow swallowtail	2
4. Hesperidae	Pyrginae	<i>Carcharodus dravira</i>	Marbled skipper	10
	Hesperiinae	<i>Cymaenes l. laurelulus</i>	Three spotted skipper	8
	Hesperiinae	<i>Pelopidas agna agna</i>	Common swift/ Dingy swift	9
Total		23		240

6. Conclusion

During the present study, a total of 240 individuals of butterflies was collected from different areas of Quetta. These individuals belong to five families and were designated into 23 species. The Superfamily Papilionoidea was represented by five families, amongst which the family Pieridae was the most abundant, while the family Nymphalidae and Lycaenidae were moderately recorded families. Papilionidae was the least encountered family among the butterflies but this family is well documented in the northern areas of Pakistan. The Superfamily Hesperioidea (Skippers) was represented by quite common individuals which were also reported from the other parts of Pakistan. This study provides a brief documentation of the butterfly fauna and its distribution in Quetta. However, we suggest that regular surveys and monitoring of the Lepidopteran species should be conducted to evaluate their diversity and abundance.

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