A Review on Diversity of Butterfly Fauna in Pakistan

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Abstract: Insects comprise more than half of animals on earth. Butterflies have been regarded as the symbol of prettiness and charm. Lepidoptera (Butterflies) is the second largest group of insects. Worldwide there are more than 28,000 species of butterflies with about 80% found in tropical regions. In Pakistan, 5,000 species of insects including 400 species of butterflies and moths have been reported. The largest Indian butterfly is Common Birdwing, *Troides helena* (Linn.) with a maximum expanse of 190 mm and the smallest is Grass Jewel, *Freyeria trochilus putli* (Kollar) with a minimum expanse of 15 mm. They are beneficial as pollinator, environmental indicator and have great aesthetic and commercial values. Butterflies have nearly global distribution, present on every continent except Antarctica. The diversity of butterfly has a predominantly in Pakistan, well-adapted to a dry steppe climate and extreme cold temperatures in winter.

Key words: Pakistan • Diversity • Insects • Butterflies • Identification

INTRODUCTION

Butterflies are generally regarded as one of the best taxonomically studied group of insects [1]. There are 1.4 million species on earth, over 53% are insects [2]. Worldwide there are more than 28,000 species of butterflies, with about 80% found in tropical regions. The Indian subcontinent bearing a diverse terrain, climate and vegetation hosts about 1,504 species of butterflies [3]. Butterflies belong to Order Lepidoptera which is the second-largest single group of similar organisms in the world [4]. More than 5,000 species of insects including 400 species of butterflies and moths have been reported from Pakistan [5, 6].

The largest Indian butterfly is Common Birdwing, *Troides helena* (Linn.) with a maximum expanse of 190 mm and the smallest is Grass Jewel, *Freyeria trochilus putli* (Kollar) with a minimum expanse of 15 mm [7]. They are holometabolous; that is, they have four distinct stages in their life cycle: egg, caterpillar or larva, the chrysalis or pupa and adult [8-10]. In view of the importance of camouflage as a survival strategy, it is not surprising that the behaviour of a butterfly is often highly correlated with its physical appearance and the character of its habitat [11].

Butterflies have been regarded as the symbol of beauty and grace [12]. They are the best known insects due to their diurnal habitats and readily recognized by their bright colours, marvellous shapes and graceful flight give pleasure to everyone [13]. Butterflies take part in the key stone ecological process of pollination [14]. They are beneficial as pollinator, environmental indicator and have great aesthetic and commercial values [15]. In nature, there is much beautiful colour on the wings of butterflies. Scientists are still baffled about exactly, how these colours are created. The diversity of colours and patterns on the wings of butterflies has caught the attention of evolutionary biologists for more than a century [16]. 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 [17]. Insects are particularly useful in the evaluation of forests for biological resource conservation.
Among the diversity of insects, butterflies are ideal subjects for ecological study in the forests [19-21]. Butterflies have nearly global distribution, present on every continent except Antarctica. Butterflies can be found in and around a multitude of habitats ranging from sunny, dry open meadows to shaded, damp woods. Among the many habitats in which butterflies live are backyards, wildflower gardens and meadows, open brushy areas, old fields, open grassy woodlands, wooded stream-sides, hardwood and coniferous forests, willow swales, birch-aspen forests, citrus groves, marshes, wet meadows, woodland edges, disturbed areas, roadsides, cut-over and second-growth forests, mountainous regions, lowlands, still canyons, deserts, flats, sand dunes and shore areas [22]. Butterflies have evolved in complex feeding relationship with plants since the development of both larvae and adults takes place on green plants [23]. Their larvae are typically host specific [24]. While adults often show a high degree of generalization. Nectar provides energy and pollen is responsible for providing proteins, lipids and vitamins [25].

Doherty [26] first time explored the butterfly fauna of Kashmir. Cotes [27] reported butterflies from Karachi and neighbouring areas. Marshal and de-Niceville [28] worked on the butterfly fauna of the Indian sub-continent. Leslic and Evans [29] reported the butterflies of Chitrál which included Maniola davendra (Moore) Maniola cheena (Moore) Junonia orithya (Linn), Argynnis hyperbius (Moore), Libythea lepita, Colias fieldi, Colias erate, Gonepteryx rhamni, Pieris brassicae, Pieris rapae, Pieris canidia, Pontia daplidice (linn), Papilio machaon, Papilio demoleus, Papilio polyctor. Butterflies from Lahore were explored by Rhe-phi-lee [30] and Puri [31]. Tytler [32] published work on butterflies of India and Barma which also included butterflies from the areas which are now in Pakistan. The butterfly fauna of the Indian region explored by many authors [33; Maxwell Lefroy [34]. Similarly, Menesse [35] worked on the butterflies of Sind. Ahsan and Iqbal [36] reported 66 species of butterflies from Lahore, among which 12 species were reported for the first time from Lahore. The species identified from Family daneidae are Danaus limniace (Cramer), Danaus cryssippus (Cramer), Danaus genutia (Cramer), Euploea core (Cramer), Polydorus aristolochiae (Fabricius), Chylasa clyta (Linnaeus), Papilio polytes (Linnaeus), Papilio demoleus (Linnaeus), Euthelia garuda (Moore), Precis almana (Linnaeus), Precis hierta (Fabricius), Precis orithya (Linnaeus), Precis iphita (Cramer), Precis lemonias (Linnaeus), Vanessa cardui (syn: Cynthia cardui) (Linnaeus), Attela phalantha (Drury), Argyreas hyperbius (Johanssen), Hypolimnus bolina (Linnaeus), Hypolimnus misippus (Linnaeus), Araschnia levana (Linnaeus), Ypthima nareda (Kollar), Mycalesis perseus (Fabricius) and Melanitis leda (Linnaeus). Family Lycaenidae included Chilades laius (Cramer), Azanus ubaldus (Cramer), Zizeeria lysimon (Hubner), Zizeera maha (Kollar), Spindasis volcanus (Fabricius), Syntarucus pilinus (Fabricius), Tarucus theophrastus (Fabricius), Lampides boeticus (linnaeus), Catochrysops strado (Fabricius) and Euchrysops cnejus (Fabricius). Family Peiridae included Delias eucharis (Drury), Anapheis aurota (Fabricius), Aporia leucodice (Eversmann), Pieris brassicae (Linnaeus), Colotis calarias (Cramer), Colotis phisadla (Godart), Colotis vestalis (Butler), Colotis danae (Fabricius), Colotis etrida (Boisduval) Cepora nerissa (Fabricius), Ixias pyrene (Linnaeus), Spialia galba (Fabricius), Badamia exclamationis (Fabricius), Parnara guttatus (Bremer and Gray), Borbo cinnara (Wallace), Pelopidas mathias (Fabricius), Pelopidas thrax (Hubner), Catopsilia pyranthe (Linnaeus), Catopsilia crocale (Cramer), Catopsilia pomona (Fabricius), Eurema laeta (Boisduval), Eurema brigitta (Cramer), Eurema hecabe (Linnaeus), Eurema blanda (Boisduval) and Colias electo (Linnaeus). Iqbal [37] recorded 51 species from Rawalpindi and Islamabad. The species included Papilio polytes romulus (Cramer), Papilio demoleus demoleus (Lin), Papilio polyctor polyctor (Boisduval), Pontia daplidice moorei (Rober), Aporia leucodice soracta (Moore), Anapheis aurota aurota (Fabricius), Pieris brassicae nepalensis (Doubleday), Pieris canidia indica (Evans), Catopsilia crocale crocale (Cramer), Catopsilia crocale pomona (Fabricius), Catopsilia pyranthe pyranthe (Linnaeus), Gonepteryx rhamni rhamni (Linnaeus), Eurema hecabe simulate (Moore), Eurema laeta laeta (Boisduval) and Colias electo fieldi (menitries). Family Hesoiidae included Badamia exclamationis (Fabricius), Taraceterocera maevius (Fabricius), Spialia galba (Fabricius), Borbo bevani (Moore), Polytrema discreta (Elwes and Edwards) and Parnara guttatus (Bremer and Gray). Family Erycinidae included Dodona durga (Kollar), Dodona eugenae (Bates) and Libythea lepita (Moore). Family Danaidae included Danaus chrysippus chrysippus (Lin), Danaus genutia (Cramer) and Danaus limniace leopardus. Family Satyridae included pararge shakra shakra (Kollar), Lethe rohria rohria (Fabricius), Eumenis paratis shiva (LeCerf), Erebia annada caeca (Watkins), Ypthima asterope mahrrata (Moore) and
Ypthima hubneri (Kirby). Family Nymphalidae included Sephis dichroa (Kollar), Atella phalantha (Drury), Argyreus hyperbius (Johanssen), Vanessa cardui (Linnaeus) Vanessa canace (Johanssen), Vanessa egea (Cramer), Hypolimnus bolina (Linnaeus), Percis hierta (Fabricius), Precis orythea (Linnaeus) Precis leonidas (Linnaeus) and Precis almana (linn). Family Lycaenidae included Rapala melempus (Cramer), Spindasis vulcanus (Fabricius), Tarucus alteratus (Moore), Tarucus venosus (Moore), Zizeeria maha (Kollar), Chilades laius (Cramer) and Heliophorus sena (Kollar). Malik [38] reported 8 species of butterflies from Rawalpindi and Murree.

Hasan [39] explored the fauna of Islamabad and Murree, reporting Papilionidae (4 species), Pieridae (13 species), Lycaenidae (11 species), Libytheidae (1 species), Nymphalidae (17 species) and Danaidae (3 species). In another study, Hasan [40] reported 80 butterfly species in 9 families from Northwest Himalaya (Gilgit and Azad Kashmir, including Papilionidae (6 species), Pieridae (15 species), Lycaenidae (17 species), Libytheidae (1 species), Nymphalidae (24 species), Satyridae (8 species), Danaidae (3 species), Erycinidae (1 species) and Hesperioidae (5 species). In another attempt, Smith and Hasan [41] reported 50 species from Northern Pakistan (Gilgit to Kunjerab). Khan et al. [42] studied the distribution and diversity of genus Papilio in Rawalpindi and Islamabad. Rafi et al. [43] published a guide to the Papilionidae of Pakistan. Naz et al. [44] reported 37 species from District Buner, KP. The species are Papilio demoleus (Linnaeus), Papilio polyctor (Boisdulav), Papilio machaon (Linnaeus), Papilio polytes (Linnaeus), Pontia daplidice (Linnaeus), Ixias pyrene (Linnaeus), Gonepteryx nepalensis (Doubleday), Eurema hecabe (linneaus), Colias erate (Esper), Colias electo (Linnaeus), Cataopsila pyranthe (Linnaeus), Pieris brassicae (Linnaeus), Pieris canidia (Sparman), Anaphaiais aurota (Fabricius), Danaus chrysippus (Linnaeus), Tirumala limniace (Cramer), Lethe rohria (fabricius), Lasionomma schakra (Kollar), Libythea lepita (Moore), Junonia orithya (Linnaeus) Junonia almana (Linnaeus), Junonia heirta (Linnaeus), Argyreus hyperbius (Linnaeus), Zizeeria maha (Kollar) Lycaena phlaeas (Linnaeus). Inayatullah et al. [45] reported 29 species included are Papilio demoleus (Linn), Papilio polyctor (Boisduval), Papilio machaon (Linnaeus), Pontia daplidice (Linnaeus), Gonepteryx nepalensis (Doubleday), Eurema hecabe (Linnaeus), Colias erate (Esper), Colias electo (Linnaeus) Catopsila pyranthe (Linnaeus), Pieris brassicae (Linnaeus), Anaphaeis aurota (Fabricius), Danaus chrysippus (Linnaeus), Tirumala limniace (Cramer), Ypthima asterope (Klug), Hipparchia parasitata (Kollar), Lethe rohria (Fabricius), Lybethea lepita (Moore), Vanessa cardui (Moore), Vanessa indica (Herbst), Nymphalis polychloros (Linnaeus), Junonia orithya (Linnaeus), Junonia hierta (Fabricius), Junonia almana (Linnaeus), Neptis hylas (Linnaeus), Argyreus hyperbius (Linnaeus), Ariadne merione (Cramer), Hypolimnus bolina (Linnaeus), Euthalia aconthea (Moore) and Lycaena phlaeas (Linnaeus). Khan et al. [46] reported 28 species. The species are Pieris brassicae, Catopsila pyranthe, Colias erate, Papilio philexenus, Colias fieldi, Junonia orithya, Pontia daplidice, Pieris canidia, Papilio polyctor, Phalantha phalantha, Danaus chrysippus Catopsila crocale, Junonia almana, Genopteryx rhanni, Lampoides boeticus, Papilio machaon, Catopsila pomana.

Khan et al. [47] reported 16, 20 and 19 species from Districts Kotly, Murpir and Bihimber respectively. Reported species are Pieris brassicae, Papilio philexenus, Gonepteryx rhanni, Argynnis kamala, Argynnis hyperbius, Colias erate, Pontia daplidice, Vanessa cardui, Papilio machaon, Danaus chrysippus, Catopsila crocale, Colias electo, Colias fieldi, Aglais urtcae, Phalantha phalantha, Papilio polyctor, Euthelia garuda, Ariadne marione and Danaus limniace. Collected species of Family Nanphalidae included Argynnis hyperbius (Linnaeus), Ariadne merione (Cramer), Cynthia cardui (Linnaeus), Junonia almana (Linnaeus), Junonia orithya (Linnaeus), Phalantha phalantha (Drury) and Hipparchia paratis (Kollar). Family Papilionidae included: Papilio demoleus (Linnaeus) and Papilio polytes (Linnaeus) while Pieridae included: Colias croceus (Geoffroy); Catopsila pomena (Fabricius); Catopsila etrida (Boisduval), Colotis protractus (Butler); Eumera hecabin (Linnaeus), Gonepteryx rhanni (Linnaeus), Ixias pyrene (Linnaeus), Belenoir aurora (Bingham), Pieris ajaka (Moore), Pieris brassicae Linnaeus, Pieris napi (Linnaeus), Pieris rapae (Linnaeus).

Parveen and Fazal [48] reported 10 species from 8 genera were identified belonging to 3 different families from Hazara University Manshtra. The species identified, the painted lady, Cynthia cardui (Linnaeus); blue pansy, Junonia orithya Linnaeus; and plain tiger, Danaus chrysippus (Linnaeus) were belonging to family Nymphalidae. The lime butterfly, Papilio demoleus Linnaeus and common Mormon, Papilio polytes Linnaeus were belonging to family Papilionidae. The dark clouded yellow, Colias croceus (Geoffroy); common grass yellow, Eumera hecabin (Linnaeus); Murree green-veined white,
Pieris ajaka Moore; green-veined white, Pieris napi (Linnaeus) and Bath white, Pontia daplidice (Linnaeus) were belonging to family Pieridae. In another study Malik (1973) reported 9 families of butterflies from West Pakistan, including Papilionidae (9 species), Pieridae (21 species), Lycænidae (21 species), Nymphalidae (19 species), Satyridae (1 species), Danaidae (9 species), Acaeridae (1 species), Erycinae (2 species) and Hesperioidea (9 species). Mal et al. [49 ] reported ten species of Pierid butterflies belonging to four genera (Anapheis, Catopsila, Colotis and Eurema) of two subfamilies (Pierinae and Coliadinae) were identified. This is the first record of Pierid butterflies from Jamshoro, Sindh, Pakistan.

CONCLUSION

The main aim of this review was to investigate the taxonomy and distribution of butterflies in the different study areas. The diversity of butterfly has a predominantly in Pakistan, well-adapted to a dry steppe climate and extreme cold temperatures in winter.

REFERENCES

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