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# Check list of first recorded dragonfly (Odonata: Anisoptera) fauna of District Lower Dir, Khyber Pakhtunkhwa, Pakistan

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**Abstract**

The dragonflies (Odonata: Anisoptera) are large, intermediate to small size, having different colours and variable morphological characters. They also carry ornamental and environmental indicator values. The first recorded, the collection of 318 dragonflies was made during May-July 2011 from district Lower Dir, Khyber Pakhtunkhwa, Pakistan. Among them 11 species of dragonflies were identified belonging to 3 families. The golden-ringed, *Cordulegaster brevistigma brevistigma* Selys is belonging to family Cordulegasteridae and Clubtails, *Onychogomphus bistrigatus* Selys is belonging to family Gomophidaed. The spine-legged redbolt, *Rhodothemis rufa* (Rambur); black-tailed skimmer, *Orthetrum cancellatum* Linnaeus; blue or black-percher, *Diplacodes lefebvrei* (Ramber); ground-skimmer, *Diplacodes trivialis* Rambur; common red-skimmer, *Orthetrum pruinosum neglectum* (Rambur); triangle-skimmer, *Orthetrum triangulare triangulare* (Selys); common-skimmer, *Sympetrum decoloratum* Selys; slender-skimmer, *Orthetrum Sabina* (Drury) and wandering-glider or global-skimmer, *Pantala flavescens* (Fabricius) are belonging to family Libellulidae. It is concluded that there is a diversity to explain dragonfly fauna from district Lower Dir.

**Keywords** Cordulegasteridae; dragonflies; Gomophidae; Libellulidae; Lower Dir.

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## 1 Introduction

Dragonflies are popular bio-control agents belonging to order Odonata found in running and standing freshwater bodies. They possess long and slender abdomen, large eyes, short antennae and long wings. Some species of dragonfly are tolerant of brackish and salty waters. Many species have small ranges and are specific to certain habitats such as alpine mountain bogs or desert wadi (Dijkstra and Lewington, 2006). They are frequently used as indicators of environmental health in the temperate regions of the world. Their sensitivity to habitat quality makes them well-suited agents for monitoring environment (Dijkstra and Lewington, 2006).

Dragonflies also possess medicinal properties and are used in medicine preparation in some countries (Asahina, 1974). They are also fried in coconut oil and served with vegetables as delicious cuisines (Hardwicke, 1990). Odonates are important predators in both adult and nymphal stages. Larvae of dragonfly prey on amphibian larvae, crustaceans, mollusks, flatworms and leeches. During outbreaks of cracker worms, dragonflies feed on caterpillars suspended on their silken threads (Ahmad, 1994).

Thompson and Watts (2006) have used the dragonflies in genetic studies. A single adult of dragonfly may eat 300-400 gnats each day. Nymphs feed on mosquito larvae and other aquatic fauna (Corbet, 2004). Some species of dragonflies are getting extinct at a rapid rate. They should be conserved, as they are part of the world's biodiversity. Their characteristics make them suitable subjects for biological research, especially for studies on behavior and ecology. They vary in their sensitivity to different sorts of pollution and are thus used as indicator of water pollution. Dragonfly can be used to control the insect vectors of dengue fever, which breed in water containers and help to control malaria and filarial diseases etc (Mitra, 2002).

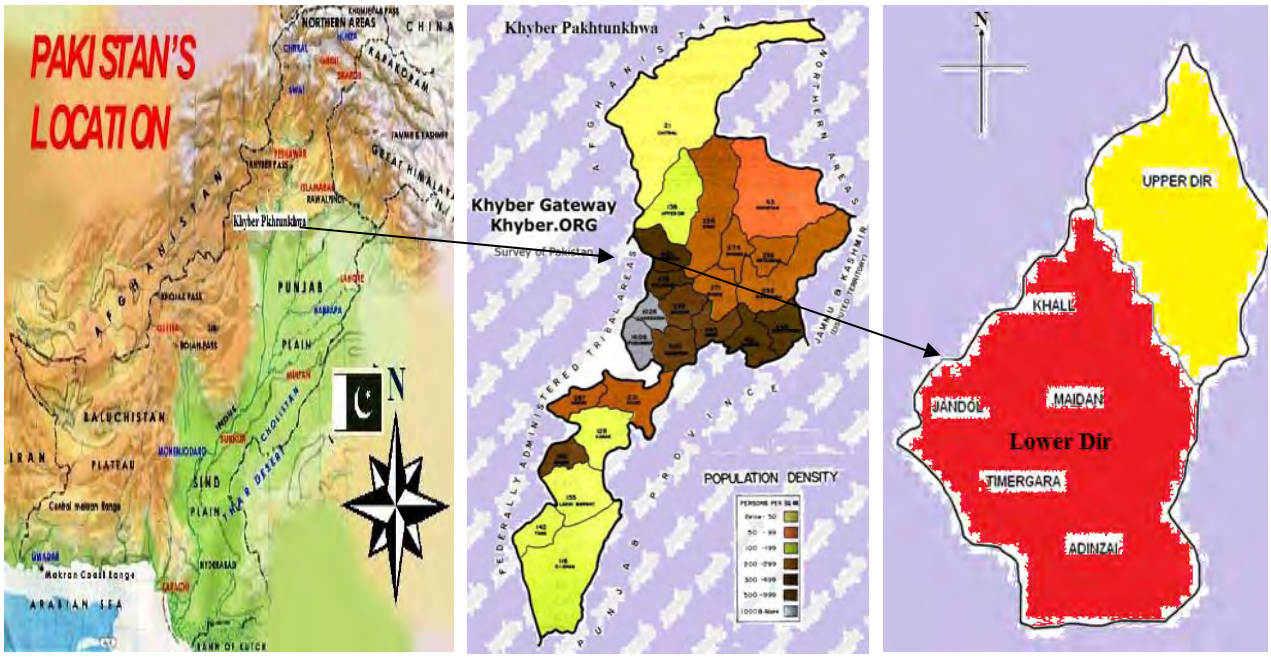


**Fig. 1** Map of district Lower Dir, Pakistan, the survey area where from dragonflies (Odonata: Anisoptera) were collecting: a) map of Pakistan showing Khyber Pakhtunkhwa (Perveen et al., 2012; Perveen et al., 2014); b) map of Khyber Pakhtunkhwa showing Lower Dir (Perveen and Ahmad, 2012 a and b); c) map of Lower Dir (Online, 2014).

Dragonfly fauna of district Lower Dir is not explored in the past. Lower Dir is one of the 24 districts of Khyber Pukhtunkhwa (KP) Province, Pakistan. Almost all of it lies in the valley of the Panjkora, which raises high in the Hindu Kush at lat. 35.45 and joins the Swat river near Chakdara, where the district is usually entered at lat. 34.40. Apart from the tehsils of Adenzai round Chakdara and Munda in the south-west, Lower Dir is rugged and mountainous (Fig. 1). Summer is the pleasant weather for tourists (Anonymous, 1998). In 2005, the population of Lower Dir of 37 Union Councils is 1,037,091 in 2005 with 514,072 males and 523,020 females. The literacy ratio of the district is among the population aged 10 years and above is 29.90%. The male literacy ratio is higher, 48.76% compared to 12.25% for female. Dir is considered one of the most sensitive areas in Pakistan in term of religious extremism. Religio-political parties that have taken root in Dir. It was ruled by a princely dynasty until 1969. There were limited facilities for education, health, road, transportation and communication for the inhabitants (Online, 2014). In view of the great importance of dragonflies, it

becomes imperative to study their taxonomy and distribution in this area; therefore, they can be aptly identified and utilized in various ways for the benefits of human. The objective of the present study is to explore dragonfly (Odonata: Anisoptera) fauna for the first time in district Lower Dir for awareness and education.

## 2 Materials and Methods

The study was conducted during May-July 2011 in district Lower Dir, KP, Pakistan. The district is bounded by Swat district to the east, Bajour Agency to the west, Upper Dir to the north and Malakand district to the south. Timergara, the district headquarters, lies at only 2,700 ft (820 m). The climate of Dir is cold and damp with mountains usually covered with white snow that receives snowfall during December-February. The average rain is 700 mm and the temperature varies from –6-38 $^{o}$C (Fig. 1) (Anonymous, 1998).

### 2.1 Collection and preservation

Dragonflies were collected by random sampling from different area of district Lower Dir by using aerial nets, collected specimens were placed them in triangular envelope after killing them in cyanide bottle, they were pinned and their body parts were set on appropriate setting boards in laboratory. On drying these were properly labeled and mounted in the collection boxes. Naphthalene balls were placed in the boxes to keep them safe from the pests.

### 2.2 Identification and description

For identification, the specimens were examined under stereoscope. Identification was done up to the specific level by running them through Fraser (1933-1934) and Chauhdry (2010). Help was also taken by already identified specimens placed in National Insect Museum (NIM), National Agriculture Research Centre (NARC), Islamabad, Pakistan. Valid names along with synonyms habitat were given for the species already recorded from Pakistan. All the identified specimens were deposited in the Zoological Museum, Department of Zoology, Hazara University, Mansehra, Pakistan (Perveen, 2012).

### 2.3 Morphometric

Identified specimens were subjected for measurement of their head, thorax, abdomen, wings and legs with a finely pointed divider and a common scale ruler. Ten specimens of each identified species were measured and data were analyzed (Perveen and Hussain, 2012).

## 3 Results

The total 318 individuals of dragonflies (Odonata: Anisoptera) were collected by random sampling belonging to 11 species of 3 families including Corduligestridae, Gomophidae and Libellulidae. First recorded checklist of the dragonfly species is presented below:

Superkingdom : Eukaryota
Kingdom : Animalia
Subkingdom : Eumetazoa
Superphylum : Ecdysozoa
Phylum : Arthropoda
Subphylum : Hexapoda
Class : Insecta
Subclass : Pterygota
Division : Palaeoptera
Order : Odonata
Suborder : Anisoptera
Superfamily : Cordulegasteridoidea

| | | |
|---|---|---|
| Family | : | Cordulegasteridae |
| Subfamily | : | Cordulegasteridinae |
| Reported species 1 | : | Golden-ringed dragonfly, *Cordulegaster brevistigma brevistigma* |
| Superfamily | : | Gomophidoidea |
| Family | : | Gomophidae |
| Subfamily | : | Gomophidinae |
| Reported species 2 | : | Clubtails dragonfly, *Onychogomphus bistrigatus* |
| Superfamily | : | Libelluloidea |
| Family | : | Libellulidae |
| Subfamily | : | Libellulinae |
| Reported species 3 | : | Blue or Black percher dragonfly, *Diplacodes lefebvrei* |
| Reported species 4 | : | Ground skimmers dragonfly, *Diplacodes trivialis* |
| Reported species 5 | : | Black tailed skimmer, *Orthetrum cancellatum* |
| Reported species 6 | : | Common red skimmer dragonfly, *Orthetrum pruinosum neglectum* |
| Reported species 7 | : | Slender skimmer dragonfly, *Orthetrum sabina* |
| Reported species 8 | : | Triangle Skimmer dragonfly, *Orthetrum triangulare triangulare* |
| Reported species 9 | : | Wandering glider or global skimmer dragonfly, *Pantala flavescens* |
| Reported species 10 | : | Spine-legged Redbolt dragonfly, *Rhodothemis rufa* |
| Reported species 11 | : | Common skimmer dragonfly, *Sympetrum decoloratum* |

**Table 1** The dragonfly (Odonata: Anisoptera) Fauna were collected from the survey area, District Lower Dir, Khyber Pakhtunkhwa, Pakistan during May-July 2011.

| **Family** | **Subfamily** | **SNo** | **Common names** | **Genus and species** | **Authority** | **Year** |
|---|---|---|---|---|---|---|
| Cordulegasteridae | Cordulegasteridinae | 1 | Golden-ringed | *Cordulegaster brevistigma brevistigma* | Selys | 1854 |
| Gomophidae | Gomophidinae | 2 | Clubtails | *Onychogomphus bistrigatus* | Selys | 1854 |
| Libellulidae | Libellulinae | 3 | Spine-legged Redbolt | *Rhodothemis rufa* | (Rambur) | 1842 |
| | | 4 | Black tailed skimmer | *Orthetrum cancellatum* | (Linnaeus) | 1758 |
| | | 5 | Blue or Black percher | *Diplacodes lefebvrei* | (Ramber) | 1842 |
| | | 6 | Ground skimmers | *Diplacodes trivialis* | Rambur | 1842 |
| | | 7 | Common red skimmer | *Orthetrum pruinosum neglectum* | (Rambur) | 1909 |
| | | 8 | Triangle Skimmer | *Orthetrum triangulare triangulare* | (Selys) | 1878 |
| | | 9 | Common skimmer | *Sympetrum decoloratum* | Selys | 1884 |
| | | 10 | Slender skimmer | *Orthetrum sabina* | (Drury) | 1773 |
| | | 11 | Wandering glider or global skimmer | Pantala *flavescens* | (Fabricius) | 1798 |

**4 Discussion**

During the present research, 318 individuals of dragonflies were collected from different areas of district Lower Dir during May-July 2011. The 2 species, i.e., *O. bistrigatus* and *C. brevistagma brevistagma* are belonging to families Gomophidae and Cordulegasteridae, respectively. The 9 species, i.e., *R. rufa, O. cancellatum, D. lefebvrei, D. trivialis, O. pruinosum neglectum, O. triangulare, S. decoloratum, O. sabina* and *P. flavescens* are belonging to family Libellulidae. Yousaf (1972) collected and identified 64 species and subspecies belonging to 24 genera of 6 subfamilies of dragonflies form various localities of West Pakistan. Kumar and Prasad (1981) reported 162 odonate species from western Himalaya. Kanth (1985) describe 39 species of dragonflies belonging to 22 genera from Azad Jammu and Kashmir. Both researches showed similarities because they have same geographical area and climate. However, in an extensive survey, Chhodary (2010) explored dragonflies fauna of Pakistan was carriedout during 2005-2009 in the 10 agro-ecological regions of Pakistan. A total of 1349 specimens belonging to 5 families, 39 genera and 68 species were collected and identified. The area of Pakistan occupied by different dragonfly families, which indicate that the specimens of the families Aeshnidae and Labellulidae are distributed throughout the country, Corduliidae dragonflies are restricted in mountainous and sub mountainous areas, whereas Cordulagesteridae species are found in only mountainous areas. The specimens of Gomphidae family are scattered in all parts of Pakistan. Therefore, the present survey was conducted in short period but identified some species were the same as by Chhodary (2010).

From the results of morphometric data the minimum head length (3 mm) was recorded in *R. rufa, D. lefebvrei, O. sabina, P. flavescens, O. bistrigatus, C. brevistigma brevistigma* and maximum length (9 mm) was recorded in *S. decoloratum*. Similarly minimum thorax length (5 mm) was noticed in *D. trivialis* and maximum thorax length (14 mm) was noticed in *C. brevistigma brevistigma.* The minimum abdomen length (11 mm) was found in *P. flavescens* and maximum abdomen length (41 mm) was found in *C. brevistigma brevistigma.* Similarly, from the result of morphometric data, the minimum (21 mm) forewing length was recorded in *O. bistrigatus* and maximum (50 mm) forewing length was recorded in *C. brevistigma brevistigma.* The minimum (21 mm) hindwing length was recorded in *D. trivialis* and maximum (49 mm) hindwing length was recorded in *C. brevistigma brevistigma.* Similarly, minimum (6 mm) forewing width was noticed in *R. rufa, O. cancellatum, D. lefebvrei, D. trivialis, S. decoloratum, P. flavescens, O. bistrigatus* and maximum (13 mm) forewing width was noticed in *C. brevistigma brevistigma.* Similarly, minimum (7 mm) hindwing width was noticed in *O. bistrigatus* and maximum (17 mm) hindwing width was recorded in *C. brevistigma brevistigma.* From the results of morphometric data the minimum foreleg length (5 mm) and maximum foreleg length (15 mm) was recorded in *O. bistrigatus* and *C. brevistigma brevistigma.* Similarly, minimum (6 mm) mesoleg length and maximum (17 mm) mesoleg length was found in *O. bistrigatus* and *C. brevistigma brevistigma.* The minimum (10 mm) hindleg length and maximum (22 mm) hindleg length was recorded in *O. bistrigatus* and *C. brevistigma brevistigma.*

Khaliq et al. (1990) identified 19 Odonata species from Poonch district of Azad Jammu and Kashmir, Pakistan. Khaliq et al. (1992) recorded 6 anisopterous species from district Mansehra (KP). Khaliq et al. (1993) identified 22 dragonfly species from Murree hills. Ahmad and Yousuf (1994) added 3 new genera and 4 species to the anisopterous fauna of KP. Ahmad (1994) identified 21 dragonfly species belonging to 14 genera and 4 families from KP. Arshad (1994) recorded 14 dragonfly species belonging to 9 genera from Balochistan. Khaliq et al. (1994) recorded 13 dragonfly species from Gilgit, Baltistan and Kashmir. Rehman (1994) described 35 species of dragonflies belonging to 22 genera of 12 subfamilies in 3 families from Punjab. Ullah (1994) recorded 12 dragonfly species belonging to 10 genera and 2 families from Sindh. However, at the present, 318 individuals of dragonflies belonging to 11 species were collected and identified from different

areas of district Lower belonging to 3 families Cordulegasteridae, Gomophidae and Libellulidae. Therefore, the dragonflies are an important topic for research and study as they have the great biodiversity all over the world. Priorities for identifying species of dragonflies need to improve monitoring, surveys and studies in some important areas of Pakistan.

## 5 Conclusion

Keeping in view, the results of current study, it is concluded that there is a lot of potential to explore Odonata fauna of distict Lower Dir. The climate and topography of this area along with lot of natural pastures and aquatic bodies support dragonflies' life and biology. However, due to rapid increase in urbanization, suitable habitats of Odonata are disappearing at an alarming rate. Further surveys and necessary conservation measures are, therefore, suggested as need of the day to utilize it, in right direction after knowing its species complex.

## 6 Recommendation

Being an important predator of crop pests, dengue and malarial vector (mosquitoes) and other harmful insects, awareness should be generated in local public through electronic and print media to save it from injudicious use of pesticides in fields. Steps should be taken to minimize the chances of disturbances and loss of natural habitats of Odonata, as it adversely affects species composition and its abundance.

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