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Odonate fauna (Insecta: Odonata) of Kashmir, Jammu & Kashmir, India: a preliminary report

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Abstract: The current study was conducted to investigate the variety of Odonata in Kashmir from November 2020 to November 2022. The study revealed the existence of 24 species, which includes 18 species of Anisoptera (dragonflies) under eight genera & two families and six species of Zygoptera (damselflies) in five genera & three families. New records of four species Orthetrum sabina (Drury, 1770), O. internum McLachlan, 1894, Aeshna petalura Martin, 1906, and Anax guttatus (Burmeister, 1839) from the region are provided herewith. Libellulidae (12 spp.) followed by Aeshnidae (six spp.) were recorded as two dominant families. This study provides some important baseline information on the odonates of Kashmir, Jammu & Kashmir, India.

Keywords: Anisoptera, biodiindicators, diversity, damselflies, dragonflies, new record, Zygoptera.

Odonates (damselflies and dragonflies) are an primitive winged insect group order with origins in the Carboniferous era about 250 million years ago (Grimaldi & Engel 2005; Tiple et al 2022). They are well-known for their colourful bodies, enormous body size, and association with aquatic surroundings. Except for Antarctica, all continents have odonates, with tropical forests having the highest species richness. (Kalkman et al. 2008). Odonates as being top predators both at larval and adult stages play an important role in both aquatic and terrestrial food chain (Sharma et al. 2007; Tiple et al 2012). They are effective biocontrol agents of mosquitoes, sand flies, stable flies having medical and veterinary importance and harmful insects of crops, orchards and forest having agricultural importance (Das et al. 2012; Tiple & Koparde 2015). Odonata are reliable indicators of overall ecosystem health, since they are highly sensitive to environmental changes (Andrew et al. 2008; Tiple & Chandra 2013). Globally 6,392 species of odonates have been described belonging to 693 genera and 18 families (Schoor & Paulson 2023) of which Indian fauna is represented by 498 species in 154 genera and 18 families (Subramanian & Babu 2020). Indian Himalaya has 257 species in 112 genera and 18 families (Subramanian & Babu 2018).

The earliest studies on the odonates of Kashmir was carried out by Calvert (1898) who reported 15 species, which was later updated by Fraser (1933, 1934, 1936) to 21 species. Further studies were added by Singh & Baijal (1954), Chowdhary & Das (1975), and Asahina (1978). In recent years, the odonate fauna has been explored by Riyaz & Sivasankaran (2021) who reported 10 species from Hirpora Wildlife Sanctuary, Shopian, Kashmir and Qureshi et al. (2022) reported 11 species from district Pulwama, Kashmir.

Regional documentation of odonates is important for their long-term conservation and management and to
study other different aspects of the taxa like taxonomy, biology, ecology, behavior and biogeography. So, the present study was conducted to study Odonata fauna of Kashmir, J&K, India.

MATERIALS AND METHODS

Study Area

Kashmir, province of Union Territory of Jammu & Kashmir is the northwestern part of Himalaya bounded by Pir Panjal Range from the south-west and Great Himalaya from the north-east. The area of the valley is 15,853 km² and geographically it lies between 33.30–34.40° N and 73.45–75.35° E. The average elevation level is 1,666 m although the surrounding mountains are at 3,000–4,250 m. The climate of the valley is temperate and has four distinct seasons (Winter, Spring, Summer, and Autumn). Kashmir is with vast and variety of aquatic and terrestrial resources manifested in the form of rivers, streams, lakes, ponds, wetlands, forests, and meadows. The present study was conducted across the Kashmir valley and 14 sites were selected on the basis of altitude encompassing different ecosystems like rivers, streams, lakes, ponds, wetlands, paddy fields, agricultural fields, forests, meadows, gardens, and parks (Figure 1).

Methods

The odonates of Kashmir were studied monthly from November 2020 to November 2022. All surveys and samplings were carried out during sunny days using a combination of direct search technique (Sutherland 1996) and opportunistic sighting methods. The photographs of the species were taken using Canon EOS 200D II with 250 mm lens. The identification of species was done using taxonomic literature (Fraser 1933, 1934, 1936) and field guides (Subramanian 2009). For species nomenclature and classification, Kalkman et al. (2020) and Subramanian & Babu (2017) were followed. Based on the frequency of sighting, species were locally categorized as Very Common (VC) when they were sighted during 75–100% of the field outings, Common (CO) when the sighting was between 50–75%, Occasional (OC) when the sighting was only 25–50%, and Rare (RA) when the sighting was below 25% (Adarsh et al. 2014).

RESULTS AND DISCUSSION

A total of 24 species belonging to two suborders under 13 genera and five families were recorded during the present study (Table 1, Image 1). Zygoptera (damselflies) is represented by six species under five genera while Anisoptera (dragonflies)
by 18 species under eight genera and two families. The Libellulidae was the most dominant family with 12 species followed by Aeshnidae with six species among the Anisoptera. Coenagrionidae represented the most prevalent family of Zygoptera constituting three species followed by Lestidae and Synlestidae each with two and one species respectively. Among these 24 species, 20 are already reported while four species *Orthetrum sabina* (Drury, 1770), *Orthetrum internum* McLachlan, 1894, *Anax guttatus* (Burmeister, 1839), and *Aeshna petalura* Martin, 1906 are reported first time from Kashmir, India.

On the basis of occurrence of 24 species, six were found to be Very Common; seven species were Common, nine species to be Occasional while two species were
Among the dragonflies, Ischnura inarmata Calvert, 1898 was found to be the most common species. Among Zygoptera, Ischnura inarmata (Calvert, 1898) and Sympetrum striolatum (Drury, 1770), Sympetrum commixtum Selys, 1840 were the most common species and Trithemis aurora (Burmeister, 1839) and Orthetrum internum McLachlan, 1894 were recorded as rare species.

Odonates are an ecologically significant insect group, hence their conservation is critical. Aquatic ecosystems in Kashmir are at high risk of vulnerability due to anthropogenic pressures such as deforestation, encroachment, pollution, and changes in land use patterns. It is critical to raise public awareness and reduce anthropogenic pressures in order to conserve the habitats of these important insects (Sánchez-Bayo & Wyckhuys 2019). As this is a preliminary survey of odonate fauna of Kashmir, we hence recommend more studies to be taken to assess this important group in all aspects like taxonomy, biology, ecology and behavior and biogeography.

**References**


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**Supplementary data (Ortherum Sabina):** A—forewing and hindwing | B—dorsal side | C—ventral side | D—abdomen. © Nisar Paray.
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