

BIODIVERSITY AND TAXONOMIC STUDY OF ORDER ODONATA FROM DISTRICT MULTAN, PUNJAB, PAKISTAN.

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ABSTRACT:

Odonata is a very important predator of wetland and agro-ecosystem because they feed on larvae of mosquitoes and syrphid flies. A few years before observed that the population of Odonata decreased very rapidly due to the excessive use of chemicals on pounds and other aquatic environment to control the mosquito and housefly populations. Reductions of these populations have huge effects on the beneficial insect-like Odonata population. Adults of Odonata feed mainly on immature Diptera. Dragonflies are predators of both stages of dipteran, first at the aquatic stage, as nymphs or naiads, and as well as adults. They move and fly very rapidly fast; sometimes, they move and migrate from one ocean to another ocean mostly found near the water. Some Odonata species live several years beneath the water surface and feed on small animals, tadpoles, small fish, and other invertebrates. Biodiversity and taxonomic study of order Odonata play a crucial role in the species identifications and classification of specific insects in a specific area. For this purpose, the survey tours were conducted in different localities of district Multan. Data were collected daily using an aerial net. After collecting phase, specimens were killed in a potassium cyanide jar. Later on, specimens were spread and preserved in wooden boxes. The samples were identified up to species level with the help of taxonomic keys and available literature. As a result, 20 species were identified based on morphology and physiology. These were also cross-checked from National Agriculture Research Centre (NARC) Islamabad. The identification keys, Photography of adults, and wings were also provided.

Keywords: Biodiversity, Odonata, District Multan, NARC Islamabad.

Introduction:

Odonates in habit acquire an amphibian nature during their life period. Some part of their life they spent in the water, while the remaining part of their life is spent in terrestrial conditions. Moreover, Odonate has been selected as either a condition of water along a gradient, temporary or permanent it all depends upon the condition of the water gradient (Johansson & Suhling, 2004). The order Odonata, popularly known as dragonflies and damselflies, originated during the Permian (250 million years BP). They are amphibiotic insects since adults are terrestrial and the larvae aquatic. Odonata larvae live in freshwater habitats, and only a few species can tolerate brackish waters. Dragonflies and damselflies are predators throughout their life; larvae feed on aquatic animals, mosquito larvae, beetle, and tadpoles while adults feed on mosquitoes, flies, termites, aphids and small moths. They are highly specific to particular aquatic habitats and utilise running and standing waters for breeding. This habitat specificity makes them an ideal bio-monitoring tool for assessing the health of freshwater ecosystems. The study of the morphology character of Odonata revealed that the order Odonata is classified into three groups, viz. Zygoptera (damselflies), Anisozygoptera and Anisoptera (dragonflies). The Odonata have also a suborder known as Anisozygoptera. A recent study revealed the living fossil of four species known worldwide; the Eastern and Central Himalayas are where this species is recorded. All these species belong to the family Cordulegastridae (Kiyoshi, 2008). Dragonflies (Odonata) mostly live in water because their larvae are aquatic. When they become adults, the young imagoes generally leave their aquatic habitat (Damm et al. 2010)

Odonata has three major suborders, Zygoptera, Anisoptera and Anisozygoptera. The suborder Anisozygoptera has unique in its characteristics. Its consists of a single extant genus, *Epiophlebia*. However, two species of *Epiophlebia* in between the two described species of *Epiophlebia* have some characteristics that are between those of Zygoptera and Anisoptera if we study in terms of morphology and behaviour characteristics (Rüppell & Hilfert, 1993).

Scientist mostly accepts that morphological character is widely used for the identification of species. It is also accepted that morphological character offers a quick, consistent method because, in conversation biology and biodiversity research, it is important to value this discipline area (Damm et al. 2010). Now a day, Odonata have been a target because it is both a predator and beneficial insect in nature. That is why most scientist focuses on this and do extensive research on Odonata in the world. Odonata has extensively studied insects nowadays in tropical regions where the temperature is high and moderate. (Woodward, 2001). Odonata has been reported in almost all continents except Antarctica, and they mostly prefer to live in warmer and tropical habitats (Boyd, 2005).

Odonates are not only predators however they have an important role as beneficial insects because Odonata prey on most serious pests either. This pest lives in dry terrestrial conditions and water ecosystems. Odonata consume on noxious flies, mosquitoes larvae, aphids, jassids, and bollworms (Bybee et al. 2008, Pramual & Kuvangkadilok, 2009)

Some fundamental biological principle indicates their habitats whereas they feed and live for nourishment and development. A biological indicator (or bioindicator) is a taxon, guild, or community selected based on its sensitivity to a particular environmental attribute; it is then assessed to make inferences about that attribute. Bioindicators play an important role as a substitute. Dragonflies have an abiotic character and other biotic features. Odonata live in a group or community (organisms living and interacting with one another in a specific habitat); these characteristics are usually regarded as very important are generally regarded as the most suitable indicators for conservation and management however this factor can only be made in an ecosystem level, but this factor restricts to being limited to a population (Faith, 1996). For monitoring habitat quality, those organisms which live in water are the most commonly used taxonomic group (Hellawell, 1986), and full information about the habitat of Odonata exists in the lotic system (flowing water) (Hilsenhoff, 2017). Work and research on macro-invertebrates as indicators in lentic systems (still water) began in the mid to late 1990s. (RESH et al. 1995). Odonates are a good indicator of present and past long-term conditions in the water and aquatic ecosystem. (Watson et al. 1982)

Adult odonate species' characters match aquatic plants (macrophytes) in nature, and most of their characteristics match adult odonates (Rith-Najarian, 1998). Newly emerging larval odonate habitat character is less well known but it will be important for research work(Convey, 1988).

Materials and Methods:

Collection and preservation

Odonates were collected by random sampling from eight localities of district Multan by using aerial nets during the year 2018. In the first visit to the citrus orchard near bassti ratta, 18 specimens were collected.



Collecting these specimens by aerial net from water channel near the water channel many crops present this type of environment very favourable for odonates here plenty of food available for odonates because here the larvae of mosquito present on which odonata feed. On second visit to the Qasim Bella canal, it had been collected 19 specimens. Similarly, the study area include eight District Multan localities to collect specimens Shear Sha Raod, Band Bosan, Qadir Pur Rawa, Village Lutfa Abad, and Head Muhammad Wala.

Habitat where the larvae of mosquito present is very favorable for odonata because they furiously feeding on them. Repellent liquid was used against to safe our self for biting of mosquito. Location where the waste of cattle are found near the water where dense population of odonate in such areas were seen.

All the specimen which collected from different location of District Multan after collection. Specimens were killed by using potassium cyanide. After killing the specimen in potassium cyanide it transfer to another empty bottle so that the colour of specimens may not become fade.



These specimens were pinned for preservation purpose. Specimen in thorax region were pinned, body parts were stretched on stretching board. The specimen was labelled to keep the record maintain of specimen for identification purpose and for future research and work on them. On label tag the date host was mention, specimen Number and locality. Odonata specimens were kept in paper envelopes live for few days allowing them to defecate to reduce the chance of decaying, then preserved dried.



Some old sample of specimens also spread by using the methodology of wetting in which first wet the specimen in butter paper for 2 to 3 hours after that the specimen become soft than stretch it on stretching board. Dried material was preserved into insect cabinets. The picture of each and every specimen was taken so that after the identification record in visual form for cross check was kept.

Every specimen by number was labelled—Almost 218 sample of odonates were collected from different localities of District Multan.

Identification of samples:

For the identification of specimens were examined under light microscope. Specimens were then identified up to species level by running them through keys following Fraser (1933-1934), Khaliq (1990), and Subramanian (2005). I identify specimen on the basis of morphology for this purpose I saw the wings venation, compound eyes and abdominal segment of odonates. After identification of specimen, All these sample by picture identification for cross check was sent to National Agriculture Research Center, Islamabad.

RESULTS

Ischnura

aurora:

Diagnostic

character and

outline

The species contains a terribly wide distribution, occurring from Islamic Republic of Pakistan and Republic of India to southern China and Taiwan (Province of China), and to the Philippines (Hämäläinen and Muller 1997), Australia plenty of Pacific Islands.



Male color pattern in complete blue distal band on tergite of seg eight (1/3 of phase length), tergite of phase nine blue. The base-colour of the seg eight tergite is melanic black with, in consequence, no prospect of dynamic color modification. Male color pattern tergite of seg eight blue (rarely with a slender, proximal black marking), tergite of seg nine blue. Behavior males mate with mature females (RJ Saint Andrew pers. comm.), however, like several *Ischnura* species (e.g. Parr 1973; Fincke 1987), sexual union is infrequent. Distribution South Asia, East Asia, Sri Lanka, India, South China. In life the abdomens of Asian males seem somewhat thicker than those of *I. aurora*, -however the utility of this as a diagnostic tool needs verification.

Material examine

Punjab: Muzaffargh: I. aurora, Basti Ratta citrus orchard 9♂,2♀,29.i.2018, Muhammad Arslan Rafique, Qasim Bella 14 ♂,8.ii.2018, Muhammad Arslan Rafique, Sher Sha Road 15♀,4♂, 10.ii.2018, Muhammad Arslan Rafique, Sher Sha Road10 ♂,1♀,28.ii.2018, Muhammad Arslan Rafique ,Band Bosan 14♂,4♀,2.iii.2018, Muhammad Arslan Rafique ,B.Z.U 1♂,1♀ 6.iii.2018, Muhammad Arslan Rafique ,Luftabad 5♀,2♂, 19.iv.2018, Muhammad Arslan Rafique, Buch Villas 2♀,2♂, 20. Iv.2018, Muhammad Arslan Rafique, Sher Sha Road 6♂,5♀, 22 .Iv.2018, Muhammad Arslan Rafique, Head Muhammad Wala 9♂,3♀, 24. Iv.2018, Muhammad Arslan Rafique.

Ceriagrion coromandelianum:

Diagnostic character and outline

These Odonata (damsel fly) species can be found in South Asian countries such as India, Sri Lanka, Pakistan and Nepal. It breed in ponds, ditches, rice fields and mangrove forest.

I identify it morphological character under light microscope. I saw it different body parts like mouth, wings and abdomen



They have a pale inexperienced head and distinctive orange-colored segments at the bottom and finish of the abdomen; within the feminine, the orange segments at the bottom of the abdomen square measure abundant duller than within the male. it's additionally referred to as yellow wax tail.



Material examine

Punjab: Muzaffargh: *C. coromendianum Basti Ratta Citrus* orchard 1♂,,29.i.2018, Muhammad Arslan Rafique,Qasim Bella 1♂,4♀, 8.ii.2018, Sher Sha Road 1♀,, 10.ii.2018, Muhammad Arslan Rafique, Sher Sha Road 1♂,5♀,28.ii.2018,Band Bosan 2♂,7♀,2.iii.2018, Muhammad Arslan Rafique ,B.Z.U 1♂,1♀ 6.iii.2018,Qadir Pur Rawa Road 10♂,3♀,17.Iv.2018, Muhammad Arslan Rafique, Luftabad 3♀,2♂, 19.iv.2018, Muhammad Arslan Rafique, Buch Villas 2♀,4♂, 20. Iv.2018, Muhammad Arslan Rafique , Sher Sha Road 6♂,2♀, 22 .Iv.2018, Muhammad Arslan Rafique.

Orthetrum Sabina

Diagnostic character and outline

Orthetrum sabina, the slender skimmer or inexperienced *Circus cyaneus* could be a species of skeeter hawk within the family Libellulidae it's widespread, being found from south-eastern Europe and North Africa to Japan and south to Australia and Micronesia Adults are achromatic to yellowness with black and pale markings. it's terribly the same as *orthetrum serapia* in look, with each species showing in northern Australia.



Pale markings on section four of the abdomen don't extend into the posterior section once viewed from higher than on *Orthetrum sabina*. mouth half in microscope for identification was additionally observed.



Odonata (dragonfly) medium-sized with a wingspan of 60-85mm. This dragonfly perches motionless movement is restricted on shrubs and dry twigs for long periods. Dragonfly voraciously preys on smaller butterflies and dragonflies.

Material examined:

Punjab: Multan: *Orthetrum Sabina*, Band Bosan Road 4♀1♂,15.Iv.2018 Muhammad Arslan Rafique, Qadir Pur Rawa 6♀,17 .Iv.2018,Muhammad Arslan Rafique, Head Muhammad Wala 2♀, 24. Iv.2018, Muhammad Arslan Rafique ,B.Z.U 4♀,4♂,26. Iv.2018.

Orthetrum pruinosum:

Diagnostic character and outline

Odonata *Orthetrum pruinosum*, the crimson-tailed marsh hawk is a species of dragonfly in the family Libellulidae. It has high biodiversity species occurring from west India to Japan and south to Java and the Sunda island. *Orthetrum pruinosum* identify on the base of abdominal segment and abdominal colour. has 10 abdominal segments and head is dark bluish in colour.



Orthetrum pruinosum male

For further identification I also saw mouth part in light microscope. Hair was observed on its head. It has large compound eye which attach to each other from center.



It breeds in puddles, ponds and tanks. Odonata (dragonfly) three subspecies are identified. A molecular phylogenetics study of *Orthetrum* dragonflies show that *Orthetrum pruinosum* is a cryptic species. I identify the female of *Orthetrum pruinosum* on the basis of morphological character and previous publish data. Female has yellow in colour and dark line present in center of abdomen from thorax to last segment of abdomen.



Orthetrum pruinosum female

Material examined:

Punjab: Multan: *Orthetrum* , Band Bosan Road 10♀5♂,15.Iv.2018, Muhammad Arslan Rafique ,Qadir Pur Rawa 3♀,1♂, Muhammad Arslan Rafique ,17 .Iv.2018, Head Muhammad Wala 2♀, 24. Iv.2018, Muhammad Arslan Rafique , B.Z.U 6♀,4♂,26 .Iv.2018 Muhammad Arslan Rafique.

Discussion:

During the present study, 218 specimens of odonata were collected form eight localities of district Multan. In Multan district biodiversity of odonates present. Maximum population of odonata seen during the period of March last week and in April. Therefore, Odonates (Dragonflies and damselfly) are considered to be an important for the present study due to their huge biodiversity. the present study consider as a database for the researchers focusing on odonata fauna in the future.

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