



Studies on the reproductive behaviour of *Ischnura aurora* (Brauer) (Odonata: Insecta) around Dholbaha Dam (Punjab Shivalik), India

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ABSTRACT : The reproductive behaviour of *Ischnura aurora* (Brauer) has been studied five times around Dholbaha Dam during 2003-2004. Courtship is well marked and male demonstrate a circular territory with a radius of about 30-50cm. The courtship wheel lasts for about 15-18 minutes performed by perching on vegetation. Oviposition is endophytic among the aquatic vegetation and lasts for 15-20 minutes. The duration of reproductive behaviour lasts for 50-85 minutes.

Key words : *Ischnura aurora*, Reproductive behaviour, Dholaha Dam, India

INTRODUCTION

Approximately 6,000 species and subspecies belonging to 630 genera in 28 families of Odonata are known from all over the world (Tsuda, 1991), out of which 499 species and subspecies of Odonata under 139 genera belonging to 17 families are reported from India (Prasad and Varshney, 1995). A few workers contributed in the field of study on the life history and behaviour of odonates such as Begum *et al.*, (1982), Copper *et al.* (1996), Corbet (1962, 1980, 1999), Cordero (1989), Cordero *et al.*, (1997), Gossum (1999), Kormondy and Gower (1965), Kumar (1972a,b,c, 1973a,b, 1980 a, b, 1981, 1984 a, b, c, 1985a, 1985b, 1988, 1989), Mitra (2005), Parr (1973), Parr & Parr (1972), Prasad (1990), Rowe (1978), Sawchyn and Gillott (1974) and Srivastava and Babu (1984). In the present study a modest attempt has been made to provide the detailed studies on the reproductive behaviour of *Ischnura aurora* (Brauer).

MATERIALS AND METHODS

A. Study area

Dholbaha Dam is a man made wetland in village Dholbaha of Distt. Hoshiarpur (Punjab: India), which is a part of Shivalik hills of Punjab state having geographical area of 9448.97 Km² and lies between latitude 30°34'10.82" and 32°33'02.96" North and longitude 74°50'30.30" and 76°52'51.26" East. It is constructed as under water harvesting structure in the year 1987, for controlling the water, which used to cause heavy loss to the nearby villages. It is earth filled dam and area under water is 132 ha. The total catchment area of dam is 56.14 Km² and it is 32 Km from Hoshiarpur town of Punjab. It exists throughout the year although the water level may vary and thus forms a congenial habitat for large number of aquatic insects and fishes. The forest type around Dholbaha Dam is moist deciduous. The prevailing climatic condition is typically sub-tropical and north Indian monsoon type with distinct summer and winter months. The temperature varies between 14°C-47°C in summer, where as between 0°C-32°C during winter. The south-west monsoon arrives during June and remains till October. The average annual rainfall varies between 400-600 mm.

METHODOLOGY

The total reservoir and surroundings were divided into four sectors in accordance with distribution and the types of vegetation and topography. In each sector five spots were selected according to the maximum availability of *Ischnura aurora* (Brauer) for the present study. Monthly collections and counting of imagoes were made regularly from the randomly selected spots. All the specimens collected from study area were deposited in the National Zoological Collection maintained by Northern Regional Station, Zoological Survey of India, Dehra Dun. Identification of adult individuals was carried out using identification keys provided by Fraser (1933) and larvae by Kumar (1973b, 1980b). The reproductive behaviour of *Ischnura aurora* (Brauer) was studied on the basis of visual observation made during the visits to study site. Field binocular (30 × 25 DCF) and stop watch have been used for taking observations. Photographs of species and their behavioural patterns were taken with the help of Sony DSC R1 10.3 mega pixel cybershot camera.

RESULTS

The five different observations on the reproductive behaviour of *Ischnura aurora* (Brauer) on dated (12.05.03, 18.06.03, 25.07.03, 11.05.04 and 22.07.04) has been studied during 2003-04, out of which three cases happened without interference on dated (18.06.03, 25.07.03 and 22.07.04). The study recorded detailed reproductive behavior as below:

(a) *Territoriality.* The males of *Ischnura aurora* (Brauer) arrived at the rendezvous during 8:30-9:30 a.m., while the females appeared from the surrounding vegetation little late during 9:15-10:00 a.m. The males after arrival perched on some nearby vegetation like *Polygonum barbatum*, *P. glabrum*, *Themeda anathera*, *Saccharum spontaneum* and on some other grasses. The perch formed the center of a circular territory with a radius of about 30-50cm. This territory was guarded or defended by the resident male from the intruding conspecific males.

(b) *Before wheel tandem.* When the female entered into the territory, the male followed her. As soon as she alighted on some vegetation, the male hovered in the air remaining at a same place and observed her very carefully. Then suddenly it jumped on her and caught her wings by its legs. After that it tried to catch the female's prothorax by its anal appendages. The pair in tandem flew to some nearby vegetation and perch. The before wheel tandem lasted for about 20-30 minutes. This was the time when intramale sperm translocation took place 3-4 times, at an interval of 2-3 minutes.

(c) *Copulatory wheel position.* After the completion of intramale sperm translocation, the courtship wheel was formed. The duration of wheel position varied from 15-18 minutes, but in one case it has been observed till 25 minutes. The pair in courtship wheel sometimes changed the perch in the same position due disturbance.

(d) *After wheel tandem.* After breaking of the wheel the male lowered the female and the female also grasped some vegetation by her legs. After wheel tandem lasted for 5-10 minutes. Then the male released her.

(e) *Oviposition.* After a rest of 10-15 minutes, the female started ovipositing unaccompanied by a male. Eggs were laid in the emergent stems of aquatic vegetation. The females went down underwater till their thorax region was above water and were never found to be submerged totally for egg laying. The females changed their places during oviposition which was continued till 15-20 minutes.

DISCUSSION

From the literature study it reveals that there is variation in reproductive behaviour of damselflies and dragonflies species to species. They exhibit different patterns in site selection, territory formation, oviposition, emergence, habitat preference etc. As Darwin (1859) stated in the "Origin of Species", that sexual selection, "depends, not on a struggle for existence, but on a struggle between the males for possession of females; the result is not death to the unsuccessful competitors, but few or no offspring". In odonates, the primary goal of an adult male is to secure mates and therefore in the polygynous mating system, competition for mating opportunities exists. Many different reproductive tactics have evolved to optimize the number of opportunities to successfully reproduce with female, the territorial behaviour is exhibited in order to gain access to the female (Brown and Orians, 1970) and the territorial behaviour, copulation and oviposition are carried out within or near the territory (Conrad and Pritchard, 1992). Several variation of the ovipositing behaviour exists in Odonata, but the male has become territorial of these oviposition sites respective to its species (Corbet, 1962). Therefore the present studies on the reproductive behaviour of *Ischnura aurora* (Brauer) highlighted the unique behavioural aspects of damselflies which vary from species to species.

ACKNOWLEDGEMENTS

The author is thankful to Dr. Arun Kumar, ex-Additional Director, Zoological Survey of India, Northern Regional Centre, Dehra Dun and Dr. J.R.B. Alfred, ex-Director, Zoological Survey of India, Kolkata for the facilities provided. Financial assistance provided by the Ministry of Environment and Forests, Govt. of India, New Delhi and Punjab State Council of Science and Technology, Chandigarh for conducting this research work, is also gratefully acknowledged.

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