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RESEARCH ARTICLE

Visual deception in oviposition site selection in female dragonfly Bradinopyga geminata (Rambur) Libellulidae : Anisoptera

P.P. Rathod, N. A. Manwar and I. A. Raja*

Department of Zoology, Shri Shivaji College of Arts, Commerce and Science, Akola -444001

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Corresponding Author

P.P. Rathod

Abstract

Vision is the most developed sense in dragonfly, uses for habitat selection and mate recognition. The present investigation explains the role of visual sense in selection of oviposition site in dragonfly. This study was reported in female of Bradinopyga geminata which observed to be decepted by the shining black surfaces as water bodies and selected them as its ovipositing site. In our study on reproductive behavior, we observed ovipositing Bradinopyga geminata females, instead of water body, selected dark brown shining colored flag base, the moving shiny black wheels of heavy vehicles and the front screen glass of a car as its oviposition site and deposited the eggs. Thus it is found that the female of dragonfly Bradinopyga geminata very much depends on its visual sense in selection of it oviposition site and capable of misguided in this regard.

INTRODUCTION

Dragonflies are ancient winged insect on the earth. They are attractive, colorful and strong flyers and generally found around water bodies. They are having largest compound eyes. Photoreception is their most developed sense in animal world. Therefore their habitat selection is primarily based on visual sense (Muller 1937). This successful habitat selection is developed in both sexes, being directed towards mating in the males, and towards mating and oviposition in the females. In adult life of dragonflies feeding and reproduction are two main events for which they are attracted toward water. Visual recognition may be regarded as the first of several factors which help to achieve sexual isolation, for reproduction they need to encounter their co-species and generally both sexes recognize each other visually. Males generally primarily visit to reproduction site, they make their territory and try to attract the receptive females. When they recognized their mate, they form the 'wheel' copulating position which is unique in animal world. Generally dragonfly having the same ovipositing site within the males territory. In case some species reproduction site and ovipostion site are quite different. Like many other insects associated with dragonfly, too detect their habitat visually by means of the horizontal polarization of light reflected from the water surface (Schwind and Horváth, 1993). Thus, they are usually attracted to various natural (Schwind 1991 and 1995), or artificial (Watson, 1992) reflecting sources of horizontally polarized light. This behavior is called positive polarotaxis. This behavior is called positive polarotaxis. Information on the overview of polarotaxis in odonate is required to evaluate the applicability of polarized-light-traps or the measures upsetting the reflection-polarization characteristics of water surfaces. In this work we report on our observations in the field with **Bradinopyga geminata**. We show here that the females dragonflies of **Bradinopyga geminata** are also attracted to manmade reflecting surfaces, considering them as water body surfaces. Bradinopyga geminata **(**Rambur) describe in India by Fraser (1924). This dragonfly is generally perched on rocks, this is because to protect themselves from predator by their cryptic color and posture. Bradinopyga geminata breeding in rainy hollows in the rocks and in variably settling, with wings flattened, on the granite face, with which their marbled grey-colored body harmonizes to such an extent that they are practically invisible. This dragonfly may be cultivated in small tanks at house near cemented wall, for

purpose of pest control or to protect from mosquito. Because the larvae and adult both feed on mosquito larvae and adult respectively.

MATERIAL AND METHOD:

a) Study Area:

Present observations were carried out in Amravati District, Maharashtra (India).

b) Methodology:

Present observation was made out at three different sites during January 2013 to September 2014. Field area was surveyed for reproductive behavior of Bradinopyga geminata. The detailed events were note down in field dairy. Occasionally we found that the Bradinopyga geminata used primarily its visual sense for selection of oviposition site. The identification of species was carried out with the help of field guide by Fraser (1936). And one of the events recorded in mobile camera micromax.

Fig 1 : Different views of eyes of Bradinopyga geminata.

Fig 2 : Bradinopyga geminata.

Observation and Discussion:- In the present observation we showed that the females of dragonfly **Bradinopyga geminata** are positively polarotactic and like many other aquatic insects are attracted to horizontally polarized light considering that to be a water surface.

a) Site one:- Flag base of Police station Nandgaonpeth, Amravati.
Observation date and time : 10 Feb. 2013 time 2.16 pm

The Flag base of Police station Nandgaonpeth , Amravati was painted with dark brown colored, which was shining and reflecting, suddenly a ovipositing female arrived there, and started ovipositing on that shiny floor . She was alone and without her mating male. The place is publically but she laid her eggs on that floor for 172 batches. The male guarding behavior was not seen in her case.

b) Site two:- The moving wheels of long truck near toll plaza Nandgaonpeth, Amravati.

Observation date and time: 17 may 2013 time 4.25 pm

The long truck was going towards toll and wheels are moving in approximately speed of about 20-25 km/hr and suddenly a ovipositing female was came there and started ovipositing on shiny, blackish, moving left side rear wheels of that truck. She was also alone and without her mating male. The wheels were in moving position then also female chases and oviposited on those wheels for 32 times.

c) **Site three: - The automobile garage near main bus stop, Amravati.**
Observation date and time: 03 September 2014 time 12.25 pm

The damaged car was under work in the public garage, unexpectedly an ovipositing female of Bradinopyga geminata arrived there and started laying her eggs on the front screen glass of that damaged car. Four to five persons were simultaneously working near that car and a person was also seated inside the car. She laid her eggs for 65 batches and move on another car was there and there also she laid her eggs on front and side glasses for 215 times and next move on third vehicle and there she laid for 15 times, total 295 times she laid her eggs. The place was full with working peoples. The guarding male was not there.

Fig 3 and 4 : Bradinopyga geminata female laying her eggs on cars front screen.

Earlier such behavior was studied by Muller (1937), who observed females of Orthetrum laying eggs on a shining cement floor in Java, and also by Kennedy (1938), who watched instances in which pool-breeders were attracted towards shining surfaces, such as those provided by roofs of automobiles or pools of petroleum, although these were obviously unsuitable as oviposition sites. The probability of mistake in selection of ovipositing site in exophytic ovipositing species are high but it may be observed in endophytic, Muller (1937) studied Copera marginipes a damselfly and reported that it frequently making ovipositing movements on a shining black laboratory bench. Bernáth et al., (2001) and Kriska et al., (2006) have observed a similar attraction of aquatic insects to car roofs. Ephemeroptera and Odonata females, moreover, often lay their eggs masse on these car surfaces (Kriska et al., (2006)). Dragonflies have also been observed to swarm above cars ([Watson 1992: Stevan et al., 2000: Bernáth et al., 2001). All these observations demonstrate that horizontally polarizing surfaces attract numerous aquatic insect species

Conclusion :

Though most developed, the visual sense in dragonfly primarily mistaken the female Bradinopyga geminata to consider the shining black surfaces as water body and as suitable site for their oviposition. Although these were obviously unsuitable as oviposition sites. It conclude that the Bradinopyga geminata female primarily used its visual sense for selection of oviposition site**.** Findings like this, may prove important in the visual ecology of dragonfly and may help in the design of traps for such insects.

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References :

Bernáth B., Szedenics G., Molnár G., Kriska G and Horváth G. (2001). Visual Ecological Impact Of "Shiny Black Anthropogenic Products" On Aquatic Insects: Oil Reservoirs And Plastic Sheets As Polarized Traps For Insects Associated With Water. Arch Nat Conserv Landsc Res;40(2):89–109

Fraser F. C. (1924). A Survey Of The Odonate (Dragonfly) Fauna Of Western India With Special Remarks On The Genera Macromia And Idionyx And Descriptions Of Thirty New Species. Rec. Indian Mus., Calcutta 26: 423-522.

Fraser F. C. (1936). The Fauna Of British India. Odonata. Vol. 3. London, Taylor And Francis.]

Kennedy C. H. (1936). Epigomphus Crepidus A New Dragonfly (Odonata: Gomphidae) From Nayarit, Mexico, With Notes On The Genus. Ann. Ent.
Soc. Amer. 29 : 126-135.

Kriska G., Csabai Z, Boda P, Malik P and Horváth G. (2006) Why Do Red And Dark-Coloured Cars Lure Aquatic Insects? The Attraction Of Water Insects To Car Paintwork Explained By Reflection-Polarization Signals. Proc R Soc B;273:1667–71

Muller H. R. A. (1937). Een Zonderlinge Vergissing Van Copera Marginipes. De Tropische Natuur 26: 95-98.

Schwind R. (1991). Polarization Vision In Water Insects And Insects Living On A Moist Substrate. J Comp Physiol A;169:531–40.

Schwind R. Spectral Regions In Which Aquatic Insects See Reflected Polarized Light. J Comp Physiol A 1995;177:439–48

Schwind R and Horváth G. (1993)Reflection-Polarization Pattern At Water Surfaces And Correction Of A Common Representation Of The Polarization Pattern Of The Sky. Naturwissenschaften;80:82–3

Stevani CV, Porto JS, Trindade DJ, Bechara EJH. Automotive Clearcoat Damage Due To Oviposition Of Dragonflies. J Appl Polym Sci 2000;75:1632–9.

Watson J.A.L. (1992) Oviposition By Exophytic Dragonflies On Vehicles. Not Odonatol;3:137

Wildermuth H, and Horváth G.(2005) Visual Deception Of A Male Libellula Depressa By The Shiny Surface Of A Parked Car (Odonata: Libellulidae). Int J Odonatol;8: 97–105

Whitehouse F. C. (1941). British Columbia dragonflies (Odonata), with notes on distribution a- ' habits. Amer. Midi. Nat. 26: 488-557. A guide to the study of dragonflies of Jamaica. Bull. Inst. Jamaica Sci. Ser. No. 3: 69 pp.