

## ECOLOGICAL RECONNAISSANCE OF ADULT ODONATA (INSECTA) OF EASTERN INDIA

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### INTRODUCTION

Eastern India, in the present context, covers parts of Assam, Bihar, Sikkim and West Bengal mainly, Mizoram, in the east-west direction. Physiographically the states belong to Assam plain, middle and lower ganga plain, and eastern Himalaya respectively. Although there is no physical barrier to divide the area into east and west but the east is more humid and west more dry. The rainfall increases as one moves from west to east. The average rainfall is variable from 200 cm to 400 cm. per year.

### HISTORICAL RECORDS

There is no consolidated report on the ecology of dragonflies of eastern India, although Mitra (1994) reported several aspects of habits and habitats of adults and cited the available records on the subject. Besides that Fraser (1933, 1934 & 1936), Asahina (1958), Dasgupta (1988, 1996), Gupta et. al. (1995), Lahiri (1975), Prasad and Ghosh (1982), Ram and Prasad (1978) reported some events on the subject.

### MATERIAL AND METHODS

The present report is based on the observations on odonata in the field, mainly in the nearby localities of Calcutta. During the preparations of the report records available from other localities have been added.

### OBSERVATIONS

*Food habits*: Dragonflies feed on both odonates and nonodonates. Six observations on odonate feeding on odonates indicate that *Ischnura senegalensis*, *Ceriagrion coromandelianum* and *Orthetrum sabina* feed on *Agriocnemis pygmaea*. *Orthetrum sabina* alone feed on *Ceriagrion coromandelianum*. Regarding non odonate prey a total of seventeen observations indicate that among insects *Pseudagrion rubriceps* feeds on Aphid (*Aphis cracivora*) *Pseudagrion microcephalum* attacks ants (*Paratrachina longicornis*) *Ceriagrion coromandelianum* and *Diplacodes trivialis* attack ant (*Solenopsis geminata*) *Brachythemis contaminata* and *Crocothemis servilia* capture House fly (*Musca domestica*) *Pantala flavescens* and *Tholymis tillarga* feed on mosquitos (? *Anopheles*), *Ischnura senegalensis* and *Crocothemis servilia* capture butterfly, *Trithemis pallidinervis* attack beetles and *Orthetrum sabina* attacks spiders.

It is interesting to note that dragonflies select their food preferably smaller than them and never eat

their own species. Intraspecies fight for food was noticed only once. Mitra (1994) reported a clash between a female and a male *Ischnura senegalensis* on February, 1967

**Breeding activities :** Breeding season, on the basis of observation on tandem and copulations, of the following ten species could be regarded as follows. *Agriocnemis pygmaea* breed throughout the year; *Pseudagrion rubriceps* and *P. microcephalum*, *Ceriagrion coromandelianum*, *Ischnura a. aurora*, *Crocothemis servilia* breed during the period from June to November; *Ischnura senegalensis* breed from March to December. Depending on the climatic conditions, breeding periods during the twenty four hour cycle are as follows. *Pseudagrion rubriceps*, *P. microcephalum*, *Ceriagrion coromandelianum*, *Ischnura aurora*, *I. senegalensis* *Agriocnemis pygmaea*, *Crocothemis servilia* breed from the early morning to noon (6.00 to 12.00 hr), while *Brachythemis contaminata* and *Tholymis tillarga* breed from late afternoon to early evening (17.00 to 18.00 hr).

All species form pair and remain near water for oviposition. But *Orthetrum sabina* form pair near water and moves away from water edges to a certain distance probably to avoid disturbances. On three occasions viz. on September 15, 1982, September 19, 1982 and August 15, 1983 one pair of *Orthetrum sabina* in each day was found copulate over water even when disturbed by one of us (TRM). Moreover, during the period, November 25 to 30, 1987, in the area of the river Kulik, in the district of West Dinajpur of West Bengal, some specimens of the species (*O. sabina*) in overcrowded localities, were found to wait on land for partners. Besides this, the copulating pairs were not leaving the area if they felt the wheels were weak, which after sometime got detached and the pair immediately formed wheel again.

Territory formation during the breeding could be noticed in *Tholymis tillarga*, *Crocothemis servilia* *Orthetrum sabina*. Intraspecies competition as well as inter species competition for territories could also be noticed. The horizontal dimension of territories depend on the density of the male population, area of the aquatic body and some intrinsic factors.

**Emergence of imago :** Mass emergence of any species could not be seen, However, emergence of certain species could be recorded, for example, *Orthetrum sabina* could be observed to emerge in the early evening during the summer months at Dum Dum Park, near Calcutta city. *Tholymis tillarga* emerged in the morning of August at the same locality; *Brachythemis contaminata* emerged in the midmorning of December in the Kachugaon forest of Assam; and *Bradinopyga geminata* in the early evening of October-November at Hazaribagh (Bihar). *Pantala flavescens* and *Crocothemis servilia* in the early afternoon of April and midmorning of September of eastern Himalaya.

**Migratory flights :** Migratory flights could be seen only in *Pantala flavescens*. The flights were noted in September and early October. The directions of the swarms were from the west to the east. The density of the swarm varied from thirty individuals to huge swarm.

**Reaction towards mobile objects :** Six species. *Pseudagrion microcephalum*, *Ictionogomphus rapax*, *Brachythemis contaminata*, *Diplacodes trivialis*, *Crocothemis servilia* and *Pantala flavescens* follow mobile objects. All species follow the objects flying parallel to the object but *Diplacodes trivialis* follow the object by moving before the object and then watch and repeat the same for some distance. The cause for this type of behaviour is not clearly known, although it is presumed to be a predatory behaviour.

*Thermo-regulation and behaviour during change of weather* : The means of thermo-regulation is variable. Sometimes the dragonflies take shelter under leaves or under any shade during the summer. During rain they do the same. But very recently one of us (TRM) noted that a pair of *Neurothemis tullia tullia* (one male and one female) were not moving out to any place while in rain.

During the hot summer *Brachythemis contaminata*, *Diplacodes trivialis* *Neurothemis tullia tullia* cover their thorax with wings and the abdomen remain in obelisk position. On the otherhand *Orthetrum sabina* *Bradinopyga geminata*, *Lathrecista asiatica* cover their thorax with wings but their abdomen remain in parallel position to the ground. Sometimes *Pantala flavescens* and *Tholymis tillarga* remain under shade and sometimes the former remain on wings a few metre above the ground. During the cool season (December to February) usually the population become reduced. But during the solar eclipse in October 1995 when the ambient temperature fell to 23°C dragonflies became inactive they were no reacting even when disturbed, although they resumed activities with the rise of temperature as soon as the eclipse was over (Mitra 1996).

*Vertical ranges of flight* : The usual flight height of eleven species were recorded as follows. *Pseudagrion microcephalum*, *P.r. rubriceps*, *Ceriagrion coromandelianum*, *Ischnura senegalensis*, *Agriocnemis pygmaea* usually fly within 30 cm above the ground. *Brachythemis contaminata* flies within a height of 50-100 cm; while *Orthetrum sabina*, *Diplacodes trivialis*, *Crocothemis servilia* go up to the height of 100-150 cm; *Rhyothemis variegata* and *Pantala flavescens* fly up to 200-300 cm above the ground.

*Death in adults* : Several dead and dying dragonflies have been collected and their conditions have been reported by Mitra (1977 & 1994). According to the conditions the death of dragonflies may be classified as follows.

(a) *Natural deaths* : One dead male *Onychargia atrocyana*, without having any external injury, has been collected. The cause of death could not be ascertained and it is presumed that it has died a natural death.

(b) *Death due to starvation* : A dead male *Crocothemis servila* and a dead female *Hemianax ephippiger* were collected from the cobwebs. Since there were no spider it is presumed that the specimens died due to starvation.

(c) *Death due to attack of ants* : Sometimes *Camponotus compressus* and *Solenopsis geminata* attack weak and overfed dragonflies and become causes of deaths. For outside India records cf. Kiauta (1971).

(d) *Death due to attack of predators* : Followings have been recorded as predators of dragonflies viz. Birds (*Acridotheres tristis*, *Corvus splendens*, *Passer domesticus*), Lizards (*Hemidactylus brookei*, *Calotes versicolor*) Amphibia (*Tylototriton verrucosus*), Spider (*Plexippus paykulli* & *Crossopriza lyoni*).

(e) *Death due to accidents* : Sometimes modern vehicles dash or sucked in flying dragonflies in the grille or press the resting insects (Mitra 1994), for records of outside India cf. Kiauta (1965).

(f) *Death due to unknown cause* : Several dead and dying individuals were collected by one of us

(TRM). The apparent reasons for those dead and dying individuals could not be ascertained (Mitra 1994).

*Species recorded from houses* : Specimen, of certain species have been collected from the house in Calcutta and suburban of the city. It is interesting to note that no specimen was collected from the forest rest houses. On the otherhand no mass entry of any species has also been recorded ? although roosting on the walls or verandah have been recorded. The cause for this type of behaviour is presumed to be the shrinkage of habitat.

Species recorded from houses are; *Trithemis pallidinervis*, *Gynacantha bayacera*, *G. rammohani*, *G. dravida*, *Hemianax ephippiger*, *Pseudagrion microcephalum*, *Ceriagrion coromandelianum*, *C. cernorubellum*, *Agriocnemis pygmaea*, *Onychargia atrocyana*, *Neurothemis tullia*, *Crocothemis servilia*, *Brachythemis contaminata*, *Tholymis tillarga*, *Orthetrum sabina*.

### SUMMARY

The paper reviews ecology of adult dragonflies in eastern India with special reference to the fauna of West Bengal.

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