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A checklist of dragonfly (Odonata: Anisoptera) diversity in the campus of University Of Science And Technology, Meghalaya (USTM), Ri Bhoi district, Meghalaya, India

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Abstract

Northeastern India has been marked by its unique species richness and diversity. Like lepidopteron diversity, distribution and diversity of odonata in this region has been well studied. However no concrete study has been done in Ri-Bhoi district of Meghalaya where the university campus is situated. USTM, a nascent university, is built up in a nice landscape documented by marshy areas and hill sides with good vegetation that harbors good dragonfly diversity. In the present study, a survey has been carried out to ascertain dragonfly diversity and 36 species of dragonflies were recorded. This study is first of its kind and has taxonomic importance as it adds few more species to the list of dragonflies from Ri-Bhoi District of Meghalaya.

Keywords: Dragonflies, Diversity, USTM, Ri-Bhoi, Meghalaya

1. Introduction

Dragonflies, belonging to the order Odonata: sub order Anisoptera, are robust flying insects that are marked by flexible head, slender abdomen, sub equal wings with distinct venations, large compound eyes and attractive body coloration. They are regarded as indicator of healthy ecosystem^[1] and thus diversity and distribution of dragonflies in an area shows the state of ecosystem of that area. About 6000 species of dragonflies were described all over the world^[2]. The topography of Meghalaya had always fascinated the odonate researchers and various studies undertaken till now showed variations in the number and distribution of dragonflies species in this part of our country^[3-7]. Odonata fauna of Meghalaya is known to comprise of 151 species under 79 genera and 14 families i.e. approximately 1/3 (151:494) of whole Indian faunal component and dragonflies of Meghalaya comprises of 85 species under 51 genera and 5 families^[7]. A very recent study showed altogether 24 species of dragonflies from ICAR complex, Umiam, Meghalaya^[8]. 19 dragonfly species were reported from Ri-Bhoi district as a whole^[7] but till date no comprehensive study was carried out in the campus of University of Science and Technology (USTM). So a survey was initiated to prepare a checklist of dragonfly diversity in the USTM campus.

2. Materials and Methods

a) Description of Study site: USTM campus (26°06'10.64"N – 91°50'43.76"E) is situated in the Ri -Bhoi district of Meghalaya and is very near to the Khanapara area of Guwahati, Assam. This nascent university is located in hilly terrain marked by densely covered trees and scattered water bodies making it a suitable habitat place for dragonflies. It covers an area of approximately 400 acres (Figure 1). The campus lies very close to Amchang reserve forest of Assam.

b) Methodology: Adult odonates were sampled in four sampling sites (Table 1).

Site 1- Area near University main gate marked by dry patches of land with scattered vegetations.

Site 2- Near RIST building marked by dense evergreen trees.

Site 3- Marshy areas of the university. This area has small natural water bodies with good vegetation cover.

Site 4- Water bodies and marshy area behind the hostels.

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The sampling was carried out using a belt transect of 10 m x 10 m. The dragonflies were observed in sampling sites between 0900 to 1400 hrs when their activity was at its peak. Field sampling was done during November 2014 to September 2015. Each transect was traversed on foot and all the adult dragonflies observed within transect line were photo-identified. In case of non-identification of a species, the dragonfly was captured with the help of butterfly net and were kept in their labeled envelopes and then killed by immersing briefly in acetone and observed under stereo microscopes for recording of identification marks. All the voucher specimens were kept in the Entomology laboratory of Zoology department of the University.

The collected specimens were identified by following the keys provided by researchers [6, 7, 9, 10]. The ICUN status of dragonflies was determined based on ICUN Red list of threatened species version 2015-4.

3. Results and Discussions

In the present study 36 species of dragonflies were recorded from four survey sites (Table 1). It has been found that 29 species of Libellulidae family is mostly present in abundance followed by family Gomphidae comprising 5 species. The detailed species names and the site from where they have been observed are given in Table 1.

It has been found that Libellulidae comprises 81% of total species identified from survey sites followed by 14% of Gomphidae and 5% of Aeshnidae (Figure 2). Family wise species abundance of dragonflies observed is shown in Figure 3.

Northeast India is one of the Biodiversity hotspot zones of our country and it forms a wonderful habitat area for both Lepidopterans and Odonata. But unlike butterfly's studies, surveys regarding diversity of dragonflies are very fragmentary in this part till date. In the present investigation, a study of dragonflies of USTM campus was carried out to ascertain the number of species present in the beautiful landscape flanked by forest areas and water bodies and a checklist preparation was initiated. The survey showed remarkable species diversity of dragonflies dominated by Libellulidae comprising 29 species followed by 5 species of Gomphidae and 2 species of Aeshnidae families. This investigation showed some addition to the number of dragonfly species already described from Ri-Bhoi district of Meghalaya [7]. 36 species were reported in this survey as compared to 19 species mentioned earlier from entire Ri-Bhoi

district which assumes a significant finding. Except *Crocothemis servilia*, *Neurothemis fulvia*, *Neurothemis intermedia*, *Orthetrum glaucum*, *Orthetrum sabina*, *Palpopleura sexmaculata* and *Pantala flavescens* all other species are reported for the first time from Ri- bhoi district. Such remarkable species richness and diversity in the university campus may be due to presence of good number of water bodies and surrounding forest covers and good climatic conditions. It is known fact that dragonflies are important bio-indicator of surrounding environment.

Brachythemis contaminata, *Crocothemis servilia*, *Neurothemis fulvia*, *Neurothemis tullia*, *Orthetrum pruinsum*, *Orthetrum sabina*, *Orthetrum triangulare*, *Urothemis signata*, *Trithemis aurora* and *Rhyothemis variegata* were found from all study areas and these were the most dominant species in the campus. Their dominance may be attributed to the presence of large marshy areas, shrubs and wetland. However presence of sizeable number of *Brachythemis contaminata* suggests that the water quality of water bodies is bad and it can be also assumed that pollution from nearby Khanapara area of Guwahati city may too helped in distribution of this species. Study reports that *Brachythemis contaminata* is a dragonfly of polluted water and it can be seen abundantly where sewage is discharged [11]. In the present study these species were mostly found near the ponds of girl's hostel areas situated in killing road of the university. Although the current ICUN Red list of threatened species version 2015-4 indicates most of the dragonfly species observed are either not accessed or of least concern but increasing pollution and destruction of forest cover may push these species in up scaled threatened categories of Red list. It is well known fact that the adult territorial form of dragonflies is very important insect taxon and it Can Contributes a lot in insect taxonomy. It is reported that the dragonflies and damselflies are ideal model insects for the investigation of the impact of the environmental warming and climate change due to its tropical evolutionary history and adaptations to temperate climate [12]. Study on diversity patterns of these creature thus can give an idea about the changing climatic condition and its effect on surrounding vegetation. This checklist, a first of its kind, showed remarkable dragonfly diversity and distribution in the beautiful landscape of university and it assumes a great taxonomic significance as it is already mentioned that this checklist shows new additions to the previously known number of species from Ri-Bhoi district of Meghalaya.

Table 1: Showing the number of dragonfly species along with their families observed in four survey areas of USTM campus.

Sl no	Name of Species	Family	Site 1	Site 2	Site 3	Site 4
1	<i>Acisoma panorpoides</i> (Rambur, 1842)	Libellulidae		√		√
2	<i>Aethriamanta brevipennis</i> (Rambur, 1842)	Libellulidae	√			√
3	<i>Brachydiplax farinosa</i> (Krüger, 1902)	Libellulidae	√		√	√
4	<i>Brachythemis contaminata</i> (Fabricius, 1793)	Libellulidae	√	√	√	√
5	<i>Crocothemis servilia</i> (Drury, 1770)	Libellulidae	√	√	√	√
6	<i>Diplacodes trivialis</i> (Rambur, 1842)	Libellulidae	√	√		√
7	<i>Neurothemis fulvia</i> (Drury, 1773)	Libellulidae	√	√	√	√
8	<i>Neurothemis intermedia</i> (Rambur, 1842)	Libellulidae		√	√	√
9	<i>Neurothemis tullia</i> (Drury, 1773)	Libellulidae	√	√	√	√
10	<i>Orthetrum glaucum</i> (Brauer, 1865)	Libellulidae	√		√	√
11	<i>Orthetrum taeniolatum</i> (Schneider, 1845)	Libellulidae	√			
12	<i>Orthetrum pruinsum</i> (Burmeister, 1839)	Libellulidae	√	√	√	√
13	<i>Orthetrum sabina</i> (Drury, 1770)	Libellulidae	√	√	√	√
14	<i>Orthetrum triangulare</i> (Selys 1878)	Libellulidae	√	√	√	√
15	<i>Palpopleura sexmaculata</i> (Fabricius, 1787)	Libellulidae				√
16	<i>Potamarcha congener</i> (Rambur, 1842)	Libellulidae	√			√
17	<i>Rhodothemis rufa</i> (Rambur, 1842)	Libellulidae		√	√	√

18	Rhyothemis variegata (Linnaeus,1763)	Libellulidae	√	√	√	√
19	Trithemis aurora (Burmeister,1839)	Libellulidae	√	√	√	√
20	Trithemis pallidinervis (Kirby,1889)	Libellulidae		√	√	√
21	Urothemis signata (Rambur,1842)	Libellulidae	√	√	√	√
22	Tholymis tillarga (Fabricius,1798)	Libellulidae	√		√	√
23	Camacinia gigantea (Brauer,1867)	Libellulidae		√	√	√
24	Bradinopyga geminata (Rambur,1842)	Libellulidae		√	√	
25	Brachydiplax chalybea (Brauer, 1867)	Libellulidae	√	√	√	√
26	Macrodiplax cora (Brauer,1867)	Libellulidae				√
27	Pantala flavescens (Fabricius,1798)	Libellulidae		√	√	
28	Neurothemis tullia tullia (Drury,1773)	Libellulidae	√		√	√
29	Tramea limbata (Desjardins,1832)	Libellulidae		√	√	
30	Anaciaeschna jaspidea (Burmeister,1839)	Aeshnidae		√		
31	Anax immaculifrons (Rambur,1842)	Aeshnidae				√
32	Ictinogomphus rapax (Rambur,1842)	Gomphidae	√			
33	Paragomphus lineatus (Selys,1850)	Gomphidae			√	
34	Macrogomphus annulatus (Selys,1854)	Gomphidae		√		√
35	Cyclogomphus ypsilon (Selys 1854)	Gomphidae	√	√		
36	Platygomphus dolabratus (Selys,1854)	Gomphidae				√

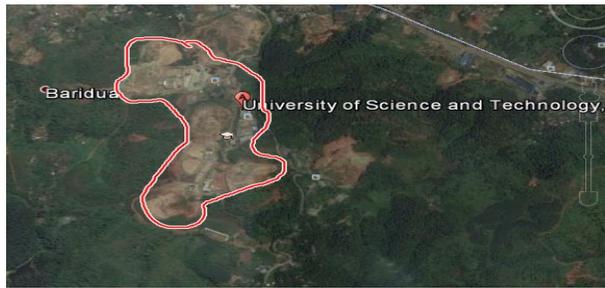


Fig 1: Showing the map of USTM campus, Meghalaya where study was carried out.

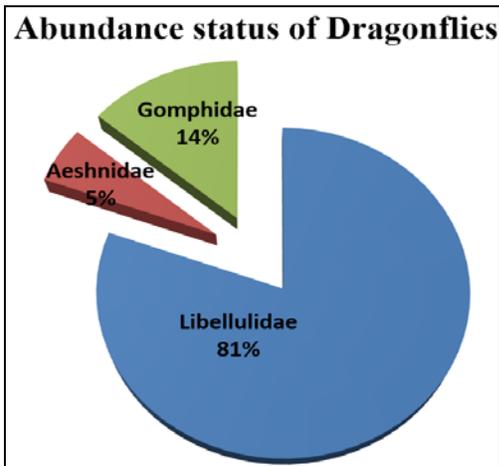


Fig 2: Percentage of occurrence of families of Dragonflies observed in USTM campus.

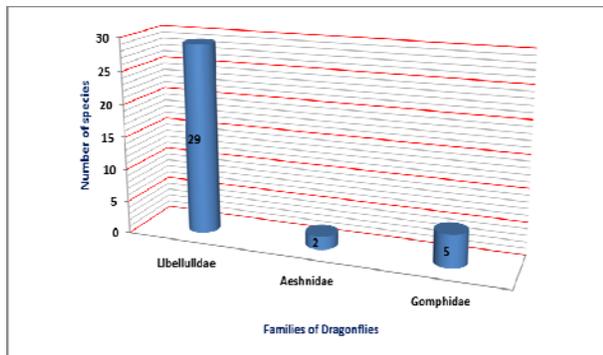


Fig 3: Chart showing family wise distribution of number of dragonflies at USTM campus.



Diplacodes trivialis



Neurothemis fulvia



Neurothemis tullia



Orthetrum Pruinorum



Aethriamanta brevipennis



Pantala flavescens



Bradinopyga geminate



Brachythemis contaminata

4. Conclusion

Diversity and distribution of various species of dragonflies found in the USTM campus depicts a great taxonomic significance. In the present study altogether 36 species of dragonflies were reported from the four study sites of the university campus, among which some of the species are new addition to Ri- Bhoi district's odonate diversity. In the light of this finding it can be concluded that ideal location, topography and surrounding climatic conditions make the USTM campus a good habitat place for dragonflies. Such species richness also calls for an intensive study in entire Ri-Bhoi district to ascertain the exact current number of anisopterans species present so that a taxonomic revision of the odonates can be done which will aid in valuable taxonomic studies.

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