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Diversity and abundance of Odonata fauna in Midnapore and Surrounding areas, West Midnapore, West Bengal

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Abstract

A study was conducted on the status and diversity of Odonata (Dragonfly and damselfly) fauna in Midnapore, West Bengal and associated areas in various natural and anthropological habitats from June 2013 to July 2015. Forty-one species of odonates belonging to the 29 Genera and 6 Families were recorded from the study area during study period. Suborder Zygoptera was represented by 2 families and Suborder Anisoptera represented 4 families. Among them 29 species were dragonflies under the families; Aeshnidae, Gomphidae, Libellulidae and Macromiidae whereas the other 12 species were damselflies under 2 families; Coenagrionidae, Platycnemididae. Species composition was highest in the family Libellulidae (56%) followed by the family Coenagrionidae (22%). Their status has been assessed in that study area. Species have been classified based on their relative estimate of abundance. Such studies on monitoring the species diversity and abundance can give valuable information and insight on the population status of Odonates.

Keywords: Odonata, Midnapore, river, damselflies, dragonfly

1. Introduction

Odonata is an order encompassing the dragonflies (Anisoptera) and the damselflies (Zygoptera), beautiful carnivorous (insectivorous) group of uniramian, aquatic palaeopteran insects. They are aerial predators hunting by sight^[1, 4]. Fabricius coined the term Odonata from the Greek word 'Odontos' (tooth) because they have teeth on their mandibles^[2]. Odonates are most primeval order of Class Insecta and possibly the first to master the art of flying, these made their first appearance during the Carboniferous era, about 250 million years ago^[3]. Even though most species of Odonates are highly specific to a habitat, some have adapted to urban areas and exploit man-made water bodies^[5]. In the present study area Odonates were mainly found in ponds, swamps, lower areas, river, rain fed canals, paddy fields, bush areas, dense forest and grasslands (mostly during monsoon). Odonates play vital role in ecosystem and keep other insects including those harmful to humans (like mosquitoes, blood-sucking flies, etc.) under control^[3]. The presence of dragonflies and damselflies may be taken as an indication of good ecosystem quality. Dragonflies tend to be much more sensitive to pollution than are damselflies^[6]. The acidity of the water, the amount and type of aquatic vegetation, the temperature, and whether the water is stationary or flowing all affect the distribution of Odonata larvae. Some species can tolerate a broad range of conditions while others are very sensitive to their environment^[6]. They lay eggs in or around freshwater sources and their presence have been believed to be significant indicator of ecological stability^[7, 8]. Odonate taxonomy was first initiated in India by British naturalists^[9]. Subsequently, Lahiri (1987) and Mitra (1983) presented clear insight into the Odonate fauna and their distribution in India^[10, 11]. There are approximately 5,952 species known worldwide and India has moderately diverse fauna of Odonata with 474 species in 142 genera and 18 families have been recorded till date^[12]. Srivastava & Sinha, have reported 178 species of Odonates from West Bengal^[13]. They have significant role in ecosystem but the survivability of the Odonata is at risk. Higher environmental pressure on lotic waters may also be responsible for the increased risk to species in these habitats. There is no such previous report of the Odonates checklist in this area. The present study has attempted to assess and explore the current status, diversity and abundance of Odonate fauna in Midnapore and its surrounding areas.

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2. Materials & Method

2.1 Location of Study Area

The study was conducted in Midnapore town and its surroundings in West Midnapore district of West Bengal (Fig 1). The area is located at longitude 87°10'E to 87°20'E and latitude 22°22'N to 22°30'N. The study area is situated on the bank of Kangsabati River on one side and other side

touching a highly dense forest of *Shorea robusta*. The study sites were Gurguripal Scrub forest, Vaduthala Reserve forest, Gopegarh Heritage Park and nearby forests, Vidyasagar University Campus and several parks, puddles, wetlands, lower land like Dharma, Kangsabati river bed and agricultural fields.

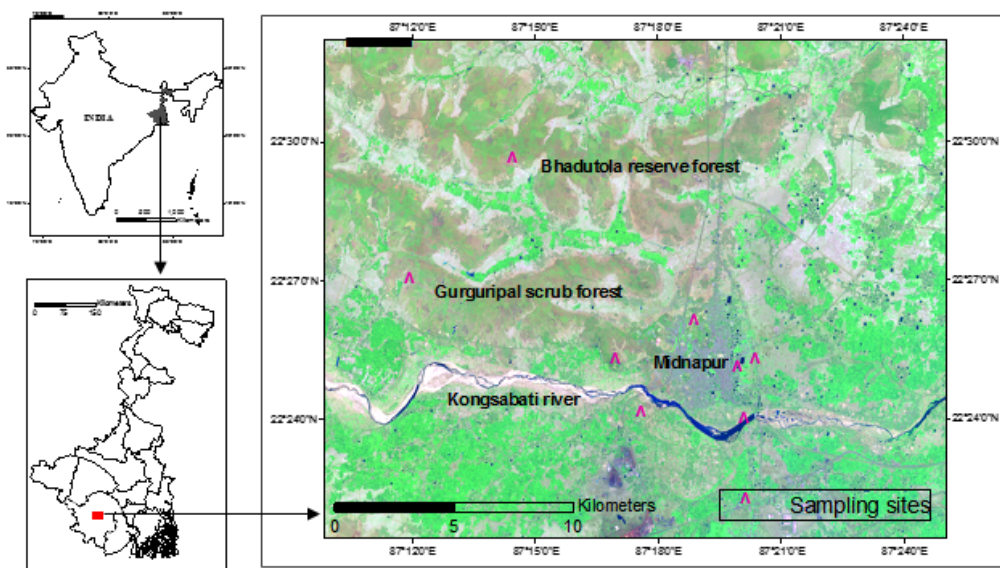


Fig 1: Map of the study area (Sampling sites are indicated by a caret)

2.2 Data collection and Identification

The survey of Odonata was carried out in the study area and it was mainly divided into 8 sites of Midnapore and surrounding areas through general random visit from June 2013 to July 2015 covering the seasons viz., summer (March-June), monsoon (July-October) and winter (November-February). Few sites were selected for repeated sampling. Most of the species were identified through photographs taken in the field and some of the species were collected using an entomological net and identified by following the keys of Fraser (1933, 1934, 1936) [14-16], Subramanian (2005) [17], Nair (2011) [3]. Species name were listed following Subramanian (2014) [12]. Photographs were taken with a Canon 600D, (55-250) mm f4-5.6 lens and (18-55) mm lens and a Nikon L820

Point and Shoot Camera. No specimen was killed or injured. Collected specimens were handled very carefully. The photographs of anal appendages, wings, thorax and eyes were taken and released back into their habitat.

3. Results

In the present study overall 41 species of Odonata were recorded in field belonging to 28 genera from 6 families. Among them 29 species were dragonflies under 4 families; Libellulidae (23), Aeshnidae (4), Gomphidae (1) and Macromiidae (1), whereas the other 12 species were damselflies under 2 families; Coenagrionidae (9), Platycnemididae (3) (Table 1).

Table 1: Checklist of Odonates recorded from the study sites

Sl. No.	Scientific Name	Common Name	Abundance mostly in year	Local Status #	IUCN Red list status*
Suborder : Anisoptera Selys, 1854					
Family: Aeshnidae Leach, 1815					
1	<i>Anaciaeschna jaspidea</i> (Burmeister, 1839)	Rusty Darner	May-Jun	VR	LC
2	<i>Anax guttatus</i> (Burmeister, 1839)	Blue-Tailed Green Darner	Mar-Sep	C	LC
3	<i>Gynacantha bayadera</i> Selys, 1891	Parakeet Darner	Aug-Sep	VR	LC
4	<i>Gynacantha dravida</i> Lieftinck, 1960	Brown Darner	Sept-Nov	R	DD
Family: Gomphidae Rambur, 1842					
5	<i>Ictinogomphus rapax</i> (Rambur, 1842)	Common Clubtail	Apr-Oct	C	LC
Family: Libellulidae Leach, 1815					
6	<i>Aethriamanta brevipennis</i> (Rambur, 1842)	Scarlet Marsh Hawk	Jan-Sep	C	LC
7	<i>Brachydiplax chalybea</i> Brauer, 1868	Rufous-Backed Marsh Hawk	Aug-Sep	R	LC
8	<i>Brachydiplax sobrina</i> (Rambur, 1842)	Little Blue Marsh Hawk	Jul-Sep	C	LC
9	<i>Brachydiplax farinosa</i> (Krüger, 1902)	Emerald-Flanked Marsh hawk	Jul-Sep	C	LC
10	<i>Brachythemis contaminata</i> (Fabricius, 1793)	Ditch jewel	Feb-Oct	VC	LC
11	<i>Bradynopyga geminata</i> (Rambur, 1842)	Granite Ghost	May-Sep	VC	LC
12	<i>Crocothemis servilia</i> (Drury, 1770)	Ruddy Marsh Skimmer	May-Sep	VC	LC
13	<i>Diplacodes trivialis</i> (Rambur, 1842)	Ground Skimmer	May-Sep	VC	LC
14	<i>Lathrecista asiatica</i> (Fabricius, 1798)	Asiatic Blood Tail	Feb-May	R	LC

15	<i>Neurothemis fulvia</i> (Drury, 1773)	Fulvous Forest Skimmer	Jun-Oct	C	LC
16	<i>Neurothemis tullia</i> (Drury, 1773)	Pied Paddy Skimmer	Jul-Oct	VR	LC
17	<i>Orthetrum pruinosum</i> (Burmeister, 1839)	Crimson-Tailed Marsh Hawk	Oct-Jan	C	LC
18	<i>Orthetrum sabina</i> (Drury, 1770)	Green Marsh Hawk	Jan-Dec	VR	LC
19	<i>Pantala flavescens</i> (Fabricius, 1798)	Wandering Glider	Jun-Sep	VC	LC
20	<i>Potamarcha congener</i> (Rambur, 1842)	Yellow-Tailed Ashy Skimmer	Feb-Oct	C	LC
21	<i>Rhyothemis variegata</i> (Linnaeus, 1763)	Common Picture Wing	Apr-Sept	VC	LC
22	<i>Rhodothemis rufa</i> (Rambur, 1842)	Rufous Marsh Glider	Mar-Sep	C	LC
23	<i>Tholymis tillarga</i> (Fabricius, 1798)	Coral-Tailed Cloud Wing	Mar-Dec	C	LC
24	<i>Tramea limbata</i> (Desjardins, 1832)	Black Marsh Trotter	Jun-Nov	VC	LC
25	<i>Tramea basilaris</i> (Palisot de Beauvois, 1805)	Red Marsh Trotter	Jun-Aug	C	LC
26	<i>Trithemis pallidinervis</i> (Kirby, 1889)	Long-Legged Marsh Glider	Jun-Sep	C	LC
27	<i>Urothemis signata</i> (Rambur, 1842)	Greater Crimson Glider	Apr-Oct	C	LC
28	<i>Zyxomma petiolatum</i> Rambur, 1842	Brown Dusky Hawk	Jun-Oct	R	LC
Family: Macromiidae Needham, 1903					
29	<i>Epothemia vittata</i> Burmeister, 1839	Common Torrent Hawk	May-Jun	VR	LC
Suborder : Zygoptera Selys, 1854					
Family: Coenagrionidae Kirby, 1890					
30	<i>Agriocnemis pygmaea</i> (Rambur, 1842)	Pygmy Dartlet	Oct-Dec	VC	LC
31	<i>Agriocnemis kalinga</i> (Nair and Subramanian, 2014)	Indian Hooded Dartlet	Oct-Feb	C	NE
32	<i>Ceriagrion cerinorubellum</i> (Brauer, 1865)	Orange-tailed Marsh Dart	Feb-Aug	VC	LC
33	<i>Ceriagrion coromandelianum</i> (Fabricius, 1798)	Coromandel Marsh Dart	Jan-Dec	C	LC
34	<i>Ischnura aurora</i> (Brauer, 1865)	Golden Dartlet	Sep-Dec	C	LC
35	<i>Onychargia atrocyana</i> (Selys, 1865)	Black Marsh dart	Jan-Dec	C	LC
36	<i>Pseudagrion decorum</i> (Rambur, 1842)	Three-Lined Dart	Feb-Sep	VC	LC
37	<i>Pseudagrion microcephalum</i> (Rambur, 1842)	Blue Dart	Dec-Feb	C	LC
38	<i>Pseudagrion rubriceps</i> Selys, 1876	Saffron-Faced Blue Dart	Feb-Dec	R	LC
Family: Platycnemididae Yakobson & Bainchi, 1905					
39	<i>Copera ciliata</i> (Selys, 1863)	Pied Bush Dart	Feb-May	R	LC
40	<i>Copera marginipes</i> (Rambur, 1842)	Yellow Bush Dart	Jan-Dec	C	LC
41	<i>Copera vittata</i> Selys, 1863	Blue Bush Dart	Jul- Sep	R	LC

* (LC – Least Concern, NE - Not Evaluated, DD - Data Deficient) # (C – Common, R - Rare, VC - Very Common, VR - Very Rare)

Family Libellulidae represents highest number of species from the study area with 23 species. In case of Suborder Zygoptera, family Coenagrionidae is dominant with 9 species under 5 genera; family Platycnemididae contain 3 species belonging to a single genus. On the other hand under Suborder Anisoptera, family Libellulidae is dominant with 23 species belonging to 18 genera, family Aeshnidae contain 4 species belonging to 3 genera and both family Gomphidae

and Macromiidae represent one species. Among these Libellulidae family was found to be dominant in study region. Family Libellulidae represent a total of 56% of the species recorded from the studied region which reveal their abundance in the region. Family Aeshnidae represent 10%, Gomphidae 2.5%, Macromiidae 2.5%, Coenagrionidae 22% and Platycnemididae 7% respectively (Figure 2).

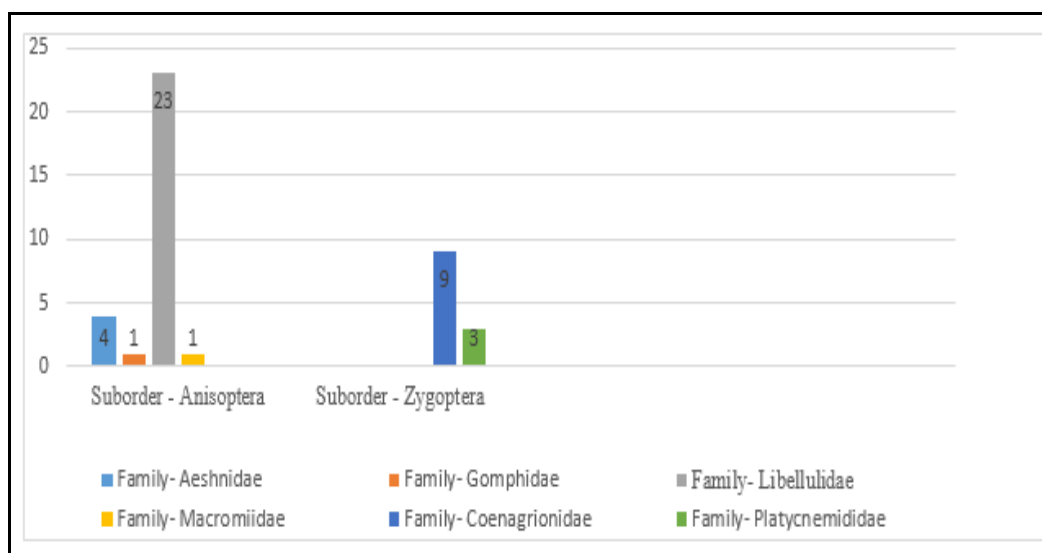


Fig 2: Abundance of different families of Odonata (Dragonflies & Damselflies) in sampling areas.

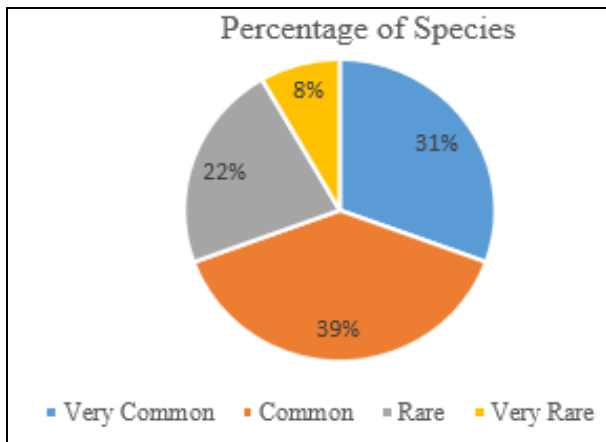


Fig 3: Local status of Odonates in study area (in percentage)

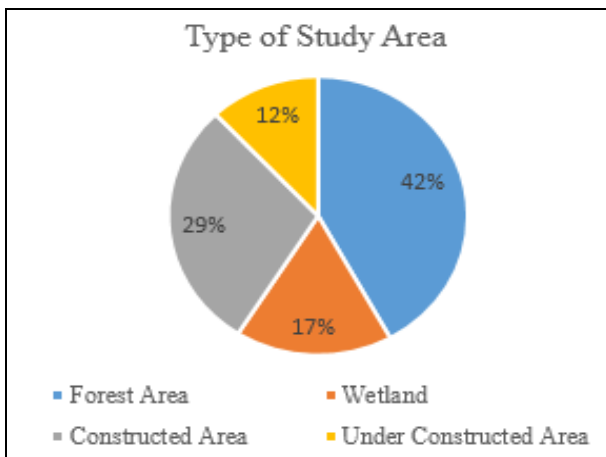


Fig 4: Types of study area (in percentage)

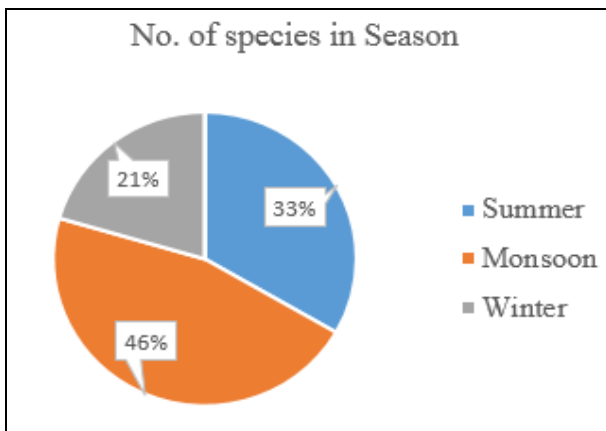


Fig 5: Percentage (%) of recorded species throughout the season

Out of 41 species found in the study area (31%) species are very common, (39%) species are common, (22%) rare and (8%) very rare in nature. This 22% rare and 8% very rare species give a new insight into the population dynamic and distributional studies (Figure 3). The present status of the study area comprises of constructed area (29%), area under construction (12%), wetlands (17%) and forest cover (42%). In wetland habitat species are most diverse and abundant followed by forest cover area (Figure 4). We divided the whole year into 3 halves – monsoon (July to October), winter (November to February) and summer (March to June).

Maximum species diversity was found during monsoon period represented by (46%) species abundance, followed by summer (33%) and winter (21%) (Figure 5).

4. Discussion

In the present study 41 species of Odonata were documented from the study area, of which 29 species are Dragonflies under 4 families and 12 species are Damselflies under 2 families. The most dominant family is Libellulidae which represents a total of 56% of species from the study region. During the survey period, it was observed that polluted water of the city enter into river through many drains & canals. Observation of *Brachythemis contaminata* (Fabricius, 1793) on river and polluted water meeting point signifies Odonates act as a potential indicator of environment. Two most interesting documentation are *Gynacantha dravida* Lieftinck, 1960, *Gynacantha bayadera* Selys, 1891 perch in bush and dense forest area. According to IUCN red data list *Gynacantha dravida* is data deficient. This species is crepuscular in nature. Nothing appears to have been recorded about its habitat requirements, although presumably it is a forest species.

Gynacantha bayadera is also a crepuscular species which probably breeds in forested swamps and marshy areas or in forest pools. In river and rain fed ponds *Anax guttatus* (Burmeister, 1839) mostly showed its strong flight in day time and was active throughout the day. *Brachythemis contaminata* (Fabricius, 1793), *Rhodothemis rufa* (Rambur, 1842) were easily sighted in the ponds situated inside the city. *Anaciaeschna jaspidea* (Burmeister, 1839) was another interesting documentation; it was sighted in bushy area at dusk. Near wetland in heavy vegetation *Ceriagrion coromandelianum* (Fabricius, 1798), *Agriocnemis pygmaea* (Rambur, 1842) were seen frequently. Species like *Copera ciliata* (Selys, 1863), *Copera marginipes* (Rambur, 1842), *Copera vittata* Selys, 1863 were usually restricted to bush, shrub near pond or lowland areas.

5. Conclusion

This is the first documentation of the odonatan from the study area and also from district. The detail survey revealed that the study area contained 8% very rare and 22% rare species and their distribution was observed in different habitat. The presence of 41 species indicated that healthy environment of that area. Most of the species are LC (least concern) according to IUCN red data list. Documented DD (data deficient) and NE (not evaluated) species clearly suggests that further details of Odonata species of these areas is required. The rapid urbanization of the city is one of the major threats to Odonate fauna. River water gets contaminated by city sewage entering into its streams, which hurts the natural growth of other organism. Flow of water is often junked by the abundance of algae, water hyacinth and new dam project on the river. Rapid urbanization, reckless construction, deforestation, river pollution, industry, less agricultural land definitely reduces the flora and fauna in this area. As a natural indicator Odonates play crucial role in that environment and help us to look forward to conserve the ecosystem. This present study will help in further study of population dynamics of Odonata species and their distribution in district.

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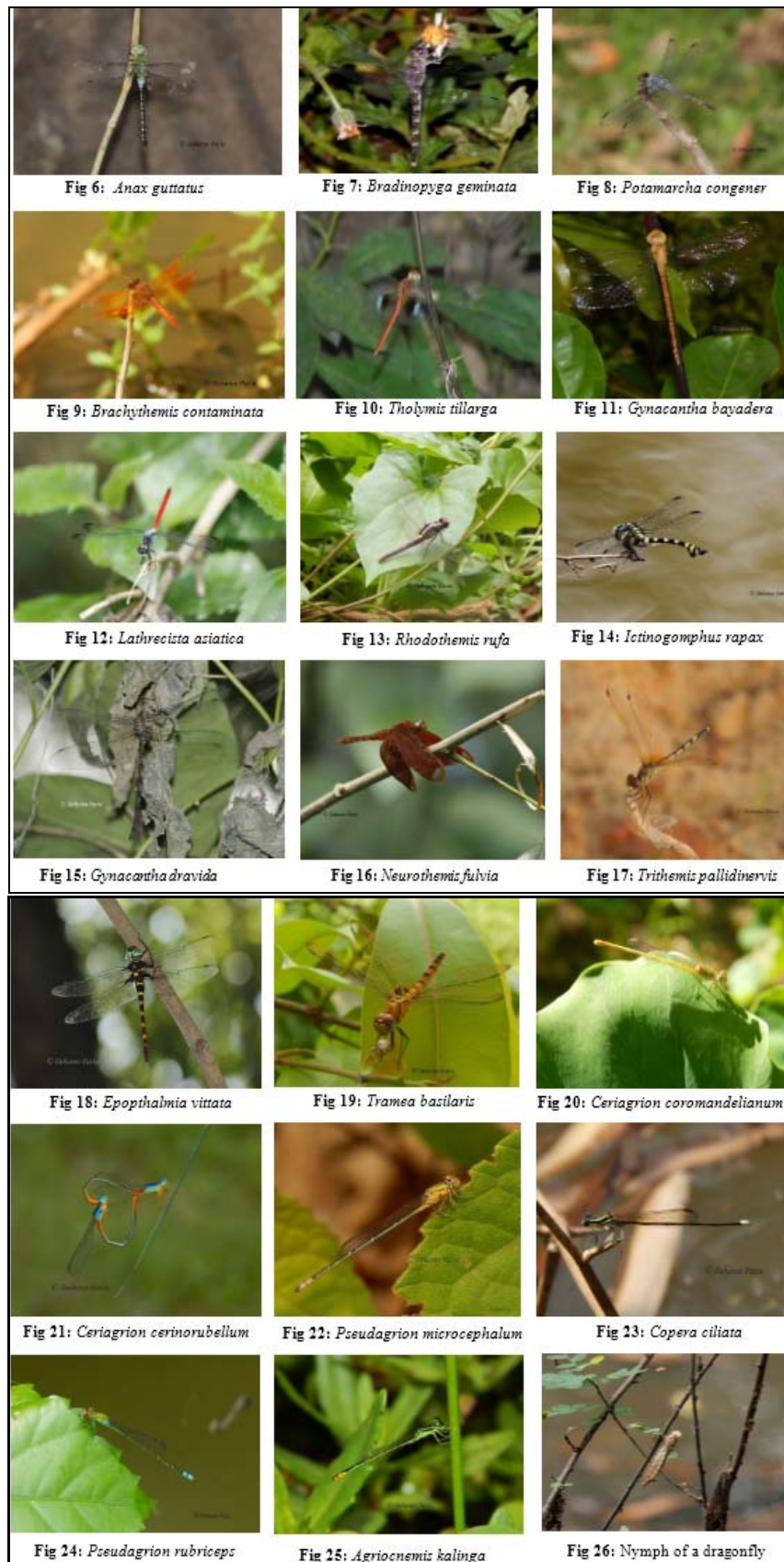


Fig 6-25: Photographs of dragonflies and damselflies taken from study area.

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