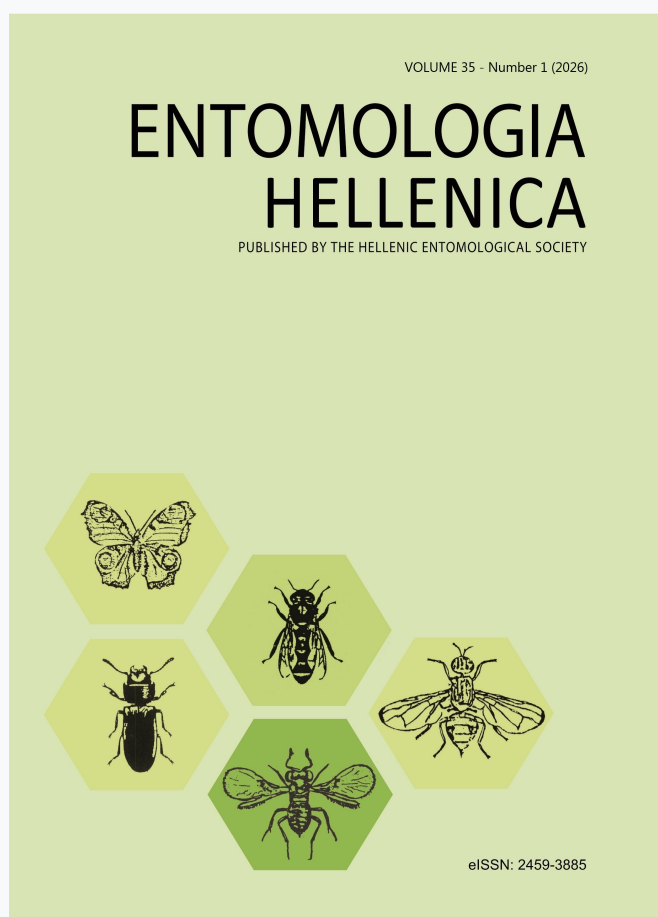


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A Preliminary checklist of Dragonflies and Damselflies (Odonata) in a small part of Madugundi, Karnataka, India

Tejas Mehendale

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A preliminary checklist of Dragonflies and Damselflies (Odonata) in a small part of Madugundi, Karnataka, India

TEJAS MEHENDALE

601, Manisha CHS, VP Road, Pendse Nagar, Dombivli (E), 421201, Thane, Maharashtra, India

ABSTRACT

A preliminary study was conducted in a small area of Madugundi village, Western Ghats, Chikkamagaluru district, Karnataka, India, to document Odonata diversity. The author recorded 67 species of odonates belonging to 10 families. This study aims to aid understanding the region's biodiversity and highlights the urgent need for targeted conservation strategies to protect the freshwater ecosystems and their unique Odonata assemblages from ongoing environmental threats.

KEY WORDS: Conservation; diversity; Madugundi; odonates; Western ghats.

Introduction

Odonata, is a group that includes dragonflies (Anisoptera) and damselflies (Zygoptera), which are captivating freshwater insects, easily recognized by their striking colours and graceful, nimble flight. These ancient predators, with fossils over 300 million years old, thrive in freshwater habitats like ponds and rivers (Grimaldi and Engel, 2005). Odonata play a key role in ecosystems, serving as important bioindicators of freshwater habitats and contributing to the regulation of populations of disease-transmitting organisms such as mosquitoes (Kadoya et al., 2004; Vatandoost, 2021). Odonata are a group of widely distributed insects comprising approximately 6300 species worldwide (Paulson et al., 2024). India, with its varied climate, diverse topography, and rich ecosystems, supports a remarkable diversity of odonates, encompassing approximately 500 species (Subramanian et al., 2018), of which 186 species are endemic to India (Kalkman et al., 2020). The state of Karnataka is recognized for its significant ecological heterogeneity, supporting a broad spectrum of habitat types and numerous wildlife protected

areas, which fosters a rich biodiversity, encompassing a wide array of flora and fauna, including a notable representation of Odonata species (Shastri et al., 2010; Subramanian KA, 2009). Madugundi is a small village located in the Western Ghats surrounded by shola habitats consisting of tropical evergreen forests. The present study aims to document Odonata diversity by providing a checklist for a small part of the region. This baseline data may provide an insight into the regional biodiversity, serving as a critical ecological reference point for subsequent investigations in ecological dynamics, and conservation biology. By documenting the diversity, the study advocates for the implementation of targeted conservation strategies to preserve the integrity of freshwater ecosystems within the geographical region.

Materials and Methods

Study area: The study area is a part of Madugundi village (Fig 1.), (13°08'05.8"N 75°26'53.8"E, 764 m) made up of forested stream, rocky hill stream, riverine habitat and a perennial waterbody (Fig 2. A-D.) surrounded by tropical evergreen forests and

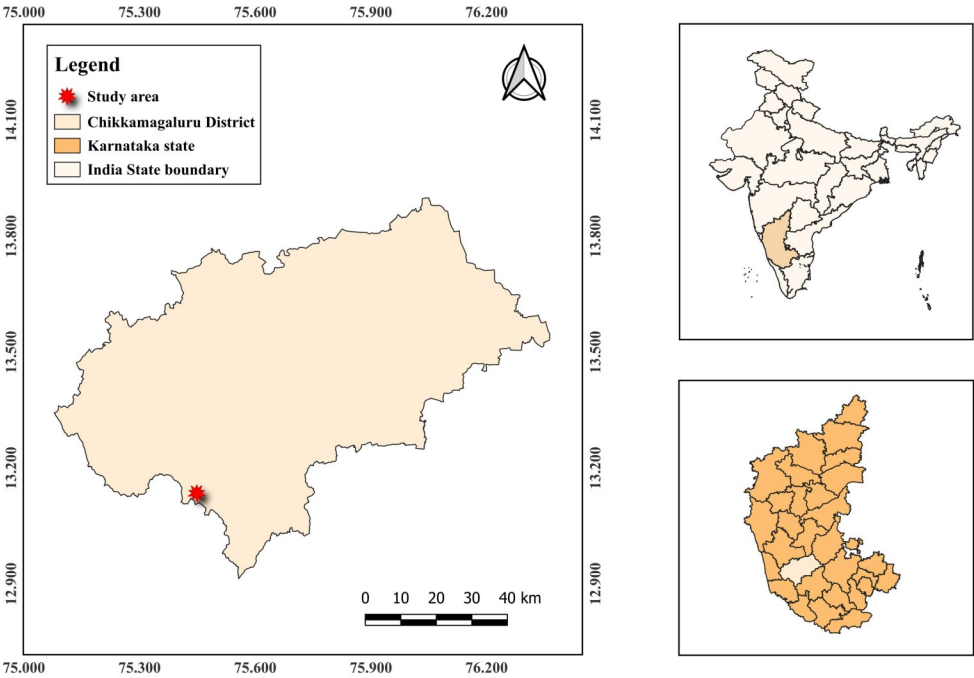


FIG. 1: Map of the study area.

shola grasslands. The Netravati River runs through the study area which creates two main freshwater habitats: parts that flow through forests and parts that are rocky streams in the hills. The study was conducted between October 2024 to May 2025 for two seasons (post monsoon and pre monsoon), in different habitats of the study area.

Data collection: The documentation was conducted using an opportunistic sampling methodology, where observations and data collection were carried out whenever suitable conditions or subjects were encountered, rather than following a predetermined, systematic sampling design. Photographs of the species were taken using Nikon d3400 with Nikkor 18-55mm, Nikkor 70-300mm kit lenses and Osaka DF860 mark III external flash. The species were identified using the taxonomic keys provided by Fraser, 1933a, 1934b, 1936c and with the help of the photographic guidebook of Subramanian, 2009, Nair, 2011 and Subramanian et al., 2018. No specimens of any species were collected during the study. The data was compiled and analysed using Microsoft Ex-

cel and Quantum GIS (QGIS) version 3.3.2 was used to create the map of study area.

Results and Discussion

A total of 67 species of odonates belonging to 45 genera from two suborders with 10 families were recorded from the study area. Thirty-four (34) species belonged to Zygoptera and the remaining 33 species represented Anisoptera. Libellulidae (Anisoptera) was the most abundant family with 25 species (37%) followed by Coenagrionidae (Zygoptera) with 13 species (19%). Contrarywise, the remaining families were represented by only a low number of species, i.e. from the suborder Zygoptera: Platynemididae by 6 species (9%), Platystictidae by 4 (6%), Euphaeidae by 4 (6%) Calopterygidae by 3 (5%), Chlorocyphidae by 2 (3%) and Lestidae by 2 (3%), while from the suborder Anisoptera: Gomphidae was represented by 5 species (7%) and Aeshnidae by 3 (5%) (Fig. 3). Among the observed species, *Euphaea dispar* Rambur, 1842, *Euphaea fraseri* (Laidlaw, 1920), *Protosticta gravelyi* Laidlaw, 1915, *Proto-*

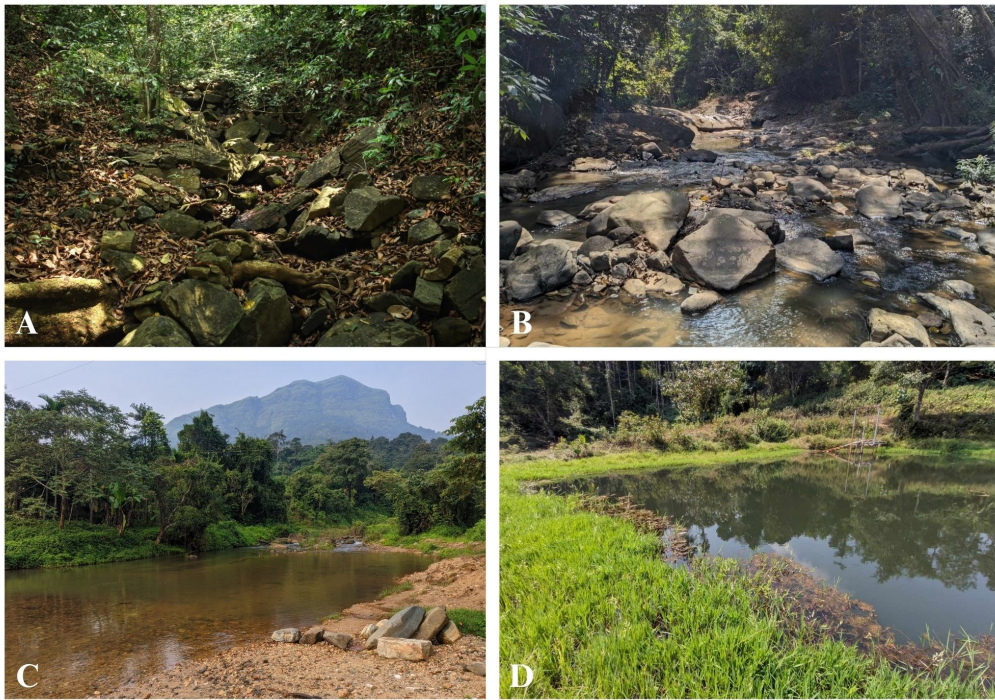


FIG. 2: Habitats of the species. A: Forested stream; B: Rocky hill stream; C: Riverine area D: Perennial waterbody.

sticta mortoni Fraser, 1924, *Protosticta sanguinostigma* Fraser, 1922, *Indosticta decanensis* (Laidlaw, 1915), *Melanoneura bilineata* Fraser, 1922, *Pseudagrion indicum* Fraser, 1924, *Lestes elatus* Hagen in Selys, 1862, *Gomphidia kodaguensis* Fraser, 1923, *Meligomphus acinaces* (Laidlaw, 1922) are endemic to Western ghats and *Heliocypha bisignata* (Hagen in Selys, 1853), *Libellago indica* (Fraser, 1928), *Heliogomphus promelas* (Selys, 1873), *Hylaeothemis apicalis* Fraser, 1926 are endemic to India (Kalkman et al., 2020). Among the species identified, *I. decanensis* stood out as a notable finding, representing the northernmost recorded distribution of the species (Mehendale & Padiyar, 2024). During the study, one species from the genus *Euphaea* Selys, 1840 was provisionally identified as *Euphaea pseudodispar* Sadasivan & Bhakare, 2021, as *Euphaea wayanadensis* Anooj, Susanth & Sadasivan, 2025 had not yet been formally published. With the subsequent description of *E. wayanadensis* recently (Anooj et al., 2025), it became

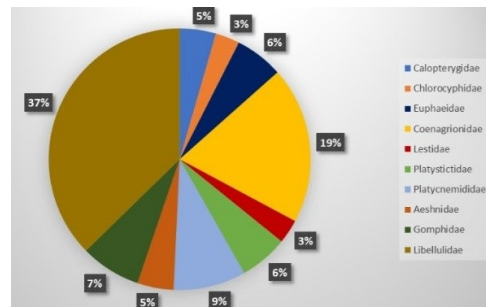


FIG. 3: Pie chart showing percentage distribution of Odonata species among families in Madugundi, Karnataka, India.

clear that the specimen recorded was indeed this newly recognized species. *M. bilineata* and *H. promelas* are categorized as Near Threatened (NT), while *P. sanguinostigma* and *I. decanensis* are listed as Vulnerable (VU) on the IUCN Red List of Threatened Species (IUCN, 2025). An annotated list as well as photos of the observed species is provided in the Table 1 and the Appendix.

Conclusion

This study provides a baseline checklist of 67 Odonata species from a small area of the Madugundi region of the Western Ghats, Karnataka, highlighting the area's significant ecological value. The observed diversity, including 16 endemic species of Odonata from the Western Ghats, underscores its importance for regional Odonata conservation. However, the region faces mounting threats from habitat fragmentation due to agricultural expansion, riparian forest degradation, and siltation of hill streams from road construction, which compromise the delicate micro-habitats required by endemic taxa. This foundational data is crucial for understanding regional biodiversity and emphasizes the necessity of targeted conservation strategies, such as the restoration of natural riparian buffers and the implementation of long-term citizen science monitoring, to protect these vital freshwater ecosystems and their unique Odonata assemblages against ongoing environmental threats.

Acknowledgements

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Table 1. Annotated list of recorded Odonata species in the study area. IUCN Red List status - NT: Near Threatened, LC: Least Concern, VU: Vulnerable, NE: Not Evaluated, DD: Data Deficient.

SL	Suborder/Family/ Scientific Name	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	IUCN Status
Suborder Zygoptera										
Family: Calopterygidae Selys, 1850										
1	<i>Neurobasis chinensis</i> (Linnaeus, 1758)	+						+		LC
2	<i>Vestalis apicalis</i> Selys, 1873						+			LC
3	<i>Vestalis gracilis</i> (Rambur, 1842)	+				+				LC
Family: Chlorocyphidae Cowley, 1937										
4	<i>Heliocypha bisignata</i> (Hagen in Selys, 1853)	+			+	+	+			LC
5	<i>Libellago indica</i> (Fraser, 1928)			+		+				LC
Family: Euphaeidae Yakobson & Bainchi, 1905										
6	<i>Dysphaea ethela</i> Fraser, 1924						+			LC
7	<i>Euphaea dispar</i> Rambur, 1842						+	+		LC
8	<i>Euphaea fraseri</i> (Laidlaw, 1920)						+	+		LC
9	<i>Euphaea wayanadensis</i> Anooj, Susanth & Sadasivan, 2025	+								NE
Family: Coenagrionidae Kirby, 1890										
10	<i>Aciagrion approximans</i> (Selys, 1876)	+		+		+				LC
11	<i>Aciagrion occidentale</i> Laidlaw, 1919		+	+		+				LC
12	<i>Agriocnemis pieris</i> Laidlaw, 1919	+		+		+				LC

Table 1. continued

13	<i>Agriocnemis pygmaea</i> (Rambur, 1842)			+		+		LC
14	<i>Agriocnemis splendidissima</i> Laidlaw, 1919			+				LC
15	<i>Amphiallagma parvum</i> (Selys, 1877)					+		LC
16	<i>Ceriagrion olivaceum</i> Laidlaw, 1914			+				LC
17	<i>Ceriagrion rubiae</i> Laidlaw, 1916	+			+			LC
18	<i>Ischnura rubilio</i> Selys, 1876			+			+	LC
19	<i>Pseudagrion australasiae</i> Selys, 1876	+			+		+	LC
20	<i>Pseudagrion indicum</i> Fraser, 1924	+	+		+		+	LC
21	<i>Pseudagrion malabaricum</i> Fraser, 1924						+	LC
22	<i>Pseudagrion rubriceps</i> Selys, 1876				+		+	LC

Family: Lestidae Calvert, 1907

23	<i>Lestes elatus</i> Hagen in Selys, 1862			+		+	+	LC
24	<i>Lestes decipiens</i> Kirby, 1893	+			+			LC

Family: Platystictidae, Kennedy, 1920

25	<i>Protosticta graveyi</i> Laidlaw, 1915			+				LC
26	<i>Protosticta mortoni</i> Fraser, 1924						+	LC
27	<i>Protosticta sanguinostigma</i> Fraser, 1922						+	VU
28	<i>Indosticta decanensis</i> (Laidlaw, 1915)			+				VU

Table 1. continued

Family: Platynemididae Yakobson & Bainchi, 1905

29	<i>Caconeura ramburi</i> (Fraser, 1922)				+	DD
30	<i>Copera marginipes</i> (Rambur, 1842)			+	+	LC
31	<i>Copera vittata</i> Selys, 1863	+			+	LC
32	<i>Melanoneura bilineata</i> Fraser, 1922				+	NT
33	<i>Onychargia atrociana</i> (Selys, 1865)		+		+	LC
34	<i>Prodasineura verticalis</i> (Selys, 1860)	+	+		+	LC

Suborder Anisoptera**Family: Aeshnidae Leach, 1815**

35	<i>Anax immaculifrons</i> Rambur, 1842	+			+		LC
36	<i>Anax indicus</i> Lieftinck, 1942	+	+			+	LC
37	<i>Gynacantha millardi</i> Fraser, 1920				+	+	LC

Family: Gomphidae Rambur, 1842

38	<i>Gomphidia kodaguensis</i> Fraser, 1923		+		+	+	DD
39	<i>Heliogomphus promelas</i> (Selys, 1873)					+	NT
40	<i>Ictinogomphus rapax</i> (Rambur, 1842)	+			+		LC
41	<i>Melligomphus acinaces</i> (Laidlaw, 1922)	+	+				DD
42	<i>Paragomphus lineatus</i> (Selys, 1850)	+	+			+	LC

Table 1. continued

Family: Libellulidae Leach, 1815

43	<i>Acisoma panor- poides</i> Rambur, 1842		+	+				LC
44	<i>Brachythemis con- taminata</i> (Fabricius, 1793)						+	LC
45	<i>Cratilla lineata</i> (Brauer, 1878)					+	+	LC
46	<i>Diplacodes trivial- is</i> (Rambur, 1842)	+						LC
47	<i>Hylaeothemis api- calis</i> Fraser, 1926						+	DD
48	<i>Indothemis lim- bata</i> (Selys, 1891)					+		LC
49	<i>Lathrecista asiati- ca</i> (Fabricius, 1798)		+					LC
50	<i>Neurothemis fulvia</i> (Drury, 1773)	+	+		+			LC
51	<i>Neurothemis inter- media</i> (Rambur, 1842)					+		LC
52	<i>Neurothemis tullia</i> (Drury, 1773)		+	+				LC
53	<i>Onychothemis testacea</i> Laidlaw, 1902						+	+
54	<i>Orthetrum chrysis</i> (Selys, 1891)	+				+		LC
55	<i>Orthetrum glau- cum</i> (Brauer, 1865)	+		+				LC
56	<i>Orthetrum luzon- icum</i> (Brauer, 1868)		+			+		LC
57	<i>Orthetrum pruino- sum</i> (Burmeister, 1839)		+	+				LC
58	<i>Orthetrum sabina</i> (Drury, 1770)	+						LC
59	<i>Palpopleura sexmaculata</i> (Fabricius, 1787)			+		+		LC

Table 1. continued

60	<i>Pantala flavescens</i> (Fabricius, 1798)	+				LC
61	<i>Rhyothemis trian-</i> <i>gularis</i> Kirby, 1889			+		LC
62	<i>Tetrathemis</i> <i>platyptera</i> Selys, 1878	+				LC
63	<i>Tramea limbata</i> (Desjardins, 1832)			+		LC
64	<i>Trithemis aurora</i> (Burmeister, 1839)	+	+		+	LC
65	<i>Trithemis festiva</i> (Rambur, 1842)	+				LC
66	<i>Urothemis signata</i> (Rambur, 1842)			+		LC
67	<i>Zygonyx iris</i> Selys, 1869			+	+	LC

Appendix. Photographs of the list of dragonflies and damselflies observed in the study area.



Neurobasis chinensis Linnaeus, 1758



Vestalis apicalis Selys, 1873



Heliocypha bisignata Hagen in Selys, 1853



Libellago indica Fraser, 1928



Euphaea dispar Rambur, 1842



Euphaea fraseri Laidlaw, 1920



Aciagrion approximans Selys, 1876



Aciagrion occidentale Laidlaw, 1919

Appendix. Photographs of the list of dragonflies and damselflies observed in the study area.



Vestalis gracilis Rambur, 1842



Agriocnemis pygmaea Rambur, 1842



Dysphaea ethela Fraser, 1924



Ceriagrion olivaceum Laidlaw, 1914



Euphaea wayanadensis Anooj, Susanth & Sadasivan, 2025



Pseudagrion australasiae Selys, 1876



Agriocnemis pieris Laidlaw, 1919



Pseudagrion rubriceps Selys, 1876

Appendix. Photographs of the list of dragonflies and damselflies observed in the study area.



Agriocnemis splendidissima
Laidlaw, 1919



Amphiallagma parvum Selys,
1877



Ceriagrion rubiae Laidlaw, 1916



Ischnura rubilio Selys, 1876



Pseudagrion indicum Fraser,
1924



Pseudagrion malabaricum
Fraser, 1924



Lestes elatus Hagen in Selys,
1862



Lestes decipiens Kirby, 1893

Appendix. Photographs of the list of dragonflies and damselflies observed in the study area.



Protosticta gravellyi Laidlaw,
1915



Protosticta mortoni Fraser,
1924



Indosticta deccanensis Laidlaw,
1915



Caconeura ramburi Fraser, 1922



Copera vittata Selys, 1863



Melanoneura bilineata Fraser,
1922



Prodasineura verticalis Selys,
1860



Anax immaculifrons Rambur,
1842

Appendix. Photographs of the list of dragonflies and damselflies observed in the study area.



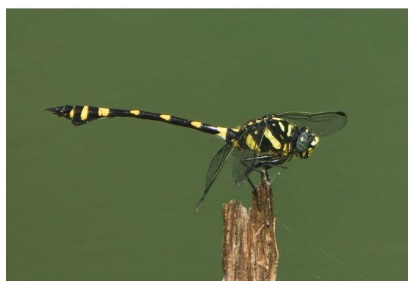
Protosticta sanguinostigma
Fraser, 1922



Gynacantha millardi Fraser,
1920



Copera marginipes Rambur,
1842



Ictinogomphus rapax Rambur,
1842



Onychargia atrocyana Selys,
1865



Acisoma panorpoides Rambur,
1842



Anax indicus Lieftinck, 1942



Hylaeothemis apicalis Fraser,
1926

Appendix. Photographs of the list of dragonflies and damselflies observed in the study area.



Gomphidia kodaguensis Fraser,
1923



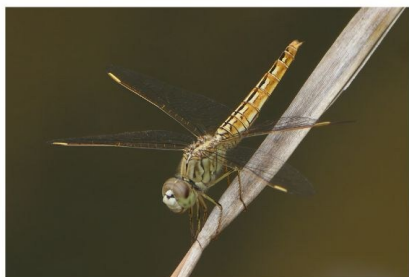
Heliogomphus promelas Selys,
1873



Melligomphus acinaces
Laidlaw, 1922



Paragomphus lineatus Selys,
1850



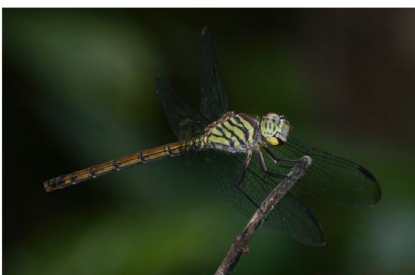
Brachythemis contaminata
Fabricius, 1793



Cratilla lineata Brauer, 1878



Indothemis limbata Selys, 1891



Lathrecista asiatica Fabricius,
1798

Appendix. Photographs of the list of dragonflies and damselflies observed in the study area.



Neurothemis fulvia Drury, 1773



Neurothemis intermedia
Rambur, 1842



Orthetrum chrysis Selys, 1891



Orthetrum glaucum Brauer,
1865



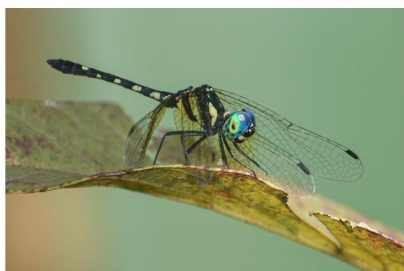
Orthetrum pruinsum
Burmeister, 1839



Palpopleura sexmaculata
Fabricius, 1787



Rhyothemis triangularis Kirby,
1889



Tetrathemis platyptera Selys,
1878

Appendix. Photographs of the list of dragonflies and damselflies observed in the study area.



Onychothemis testacea Laidlaw,
1902



Zygonyx iris Selys, 1869



Orthetrum luzonicum Brauer,
1868



Pantala flavescens Fabricius,
1798



Urothemis signata Rambur, 1842