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ODONATA OF EASTERN BANGLADESH WITH THREE NEW RECORDS FOR THE COUNTRY

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Abstract: A study was conducted in the eastern region of Bangladesh to contribute to the knowledge of the country's Odonata fauna. A total of 75 species belonging to nine families was recorded during the study period from April 2014 to July 2016. Two zygopteran species, *Calicnemia imitans* and *Prodasineura autumnalis*, and one anisopteran species, *Megalogomphus smithii*, are new records for the country. The *Megalogomphus* genus is recorded for the first time from Bangladesh.

Keywords: Distribution, diversity, Indo-Burma biodiversity hotspot, Odonata.

Bangladesh, situated in southern Asia, possesses an enormous area of wetlands including ponds, rivers, freshwater lakes, marshes, and extensive mangrove swamps. The hilly areas of the northeastern and southeastern regions receive precipitation throughout the year and are rich in waterfalls and streams. In addition, during monsoon, many paddy fields and irrigation channels hold water for more than three months and generate numerous temporary water reservoirs. These diverse range of water resources offers ambient microhabitats for many Odonata species (Chowdhury & Mohiuddin 1994). Till date, 105 species of odonates are recorded from Bangladesh (Begum et al.

1977; Chowdhury & Akhteruzzaman 1983; Chowdhury & Mia 1989; Chowdhury & Mohiuddin 1993; Noruma & Alam 1995; Chowdhury & Mohiuddin 2011; Khan 2015a,b). Among these, 76 species from seven families are reported from the northeastern region (Khan 2015b). On the other hand, 90 species are reported from the southeastern region (Chowdhury & Mohiuddin 2011). The checklist of the eastern region, however, is not comprehensive and many prospective habitats are yet to be explored.

The eastern region of Bangladesh is situated in the Indo-Burma biodiversity hotspot and is rich with diverse floral and faunal communities. This region has a few semi-evergreen forests and wildlife sanctuaries enriched with numerous streams and waterfalls. In addition to that, there are many marshes and lakes that provide ambient habitats for odonates. Despite being a suitable habitat for Odonata fauna, there is a lack of studies annotating the order of the eastern region to date. Moreover, the previous research initiatives left many potential habitats to survey. The current study is a comprehensive approach for the documentation of the Odonata diversity of the eastern region of Bangladesh.

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MATERIALS AND METHODS

Study area

The odonates were surveyed from the entire Sylhet Division and five districts of Chittagong Division, namely, Bandarban, Cox's Bazar, Chittagong, Khagrachari, and Rangamati, of Bangladesh (Fig. 1). In the northeastern region that is administratively under Sylhet Division, odonates were surveyed in Khadimnagar National Park, Tilagar Eco Park, Shahjalal University of Science and Technology campus, Satchari National Park, Lawachara National Park, and Madhobpur Lake. On the other hand, in the southeastern region that is administratively under Chittagong Division, odonates were surveyed in the Chittagong University campus, Kaptai National Park, Bariadhala National Park, and many streams and waterfalls in the areas associated with Chittagong, Khagrachari, and Bandarban districts.

Specimen collection and identification

During the survey, potential habitats like marshes, ponds, streams, streams associated with forest patches, and temporary watersheds created during the monsoon were scanned thoroughly from 09.00hr to 16.00hr. In the field, the species were photographed using a Canon 600 DSLR camera fitted with a 55–250 mm telephoto zoom lens. The specimens were captured using an insect-sweeping net and brought into the Department of

Biochemistry and Molecular Biology, Shahjalal University of Science and Technology, Sylhet, Bangladesh, for further identification and deposition. In the laboratory, the specimens were examined under the microscope and identified based on the available identification keys provided by Fraser (1933, 1934, 1936) and Asahina (1993). The odonates were classified according to Dijkstra et al. (2013). The collected specimens are stored in my personal collection in the department of Biochemistry and Molecular Biology department in the Shahjalal University of Science and Technology, Bangladesh.

RESULTS

A total of 75 species from nine families belonging to 45 genera were recorded from the eastern region of Bangladesh (Table 1, Fig. 2). Among the documented odonates, 45.33% (34 species) of 18 genera belong to the Zygoptera suborder while 54.66% (41 species) of 27 genera belong to the Anisoptera suborder (Table 1). Libellulidae was the predominant Anisoptera family with 35 species from 22 genera (Table 1, Fig. 2). On the other hand, Coenagrionidae was the best represented Zygoptera family with 18 species from six genera (Table 1, Fig. 2). Three species, *Calicnemia imitans*, *Prodasineura autumnalis*, and *Megalogomphus smithii*, were recorded for the first time from Bangladesh.

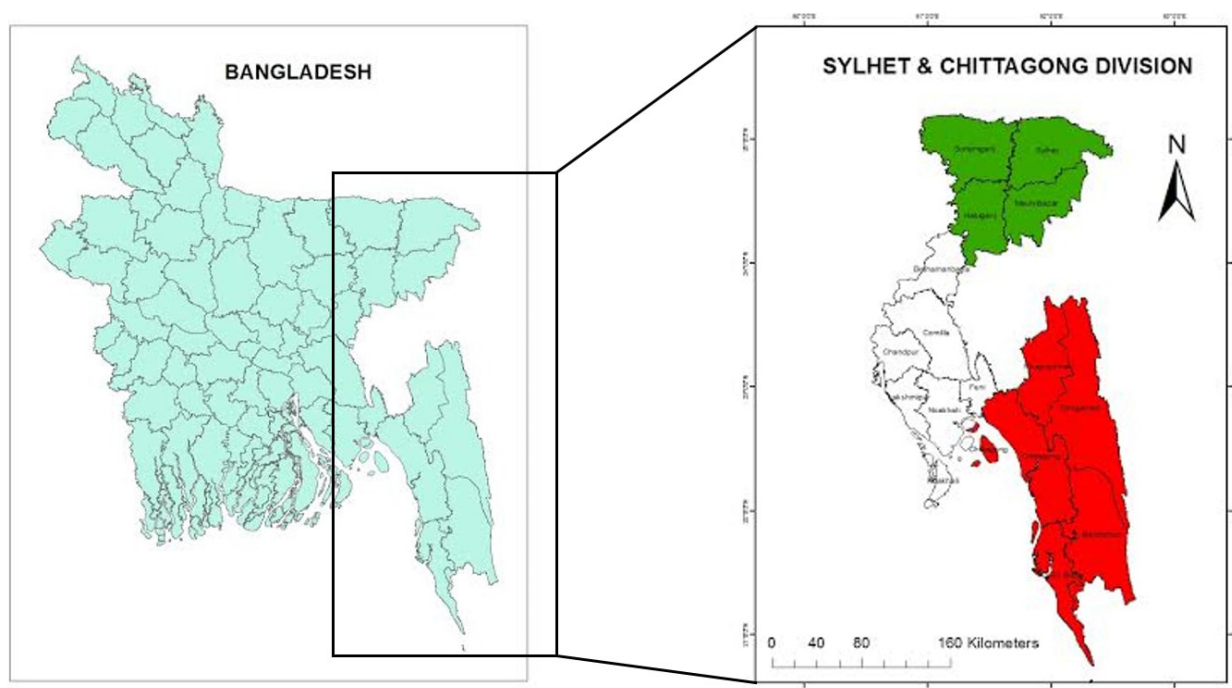


Figure 1. A reference map of the eastern region of Bangladesh. The northeastern region is administratively under Sylhet Division and the southeastern region is under Chittagong Division. The red and green colours represent the area covered during the study period.

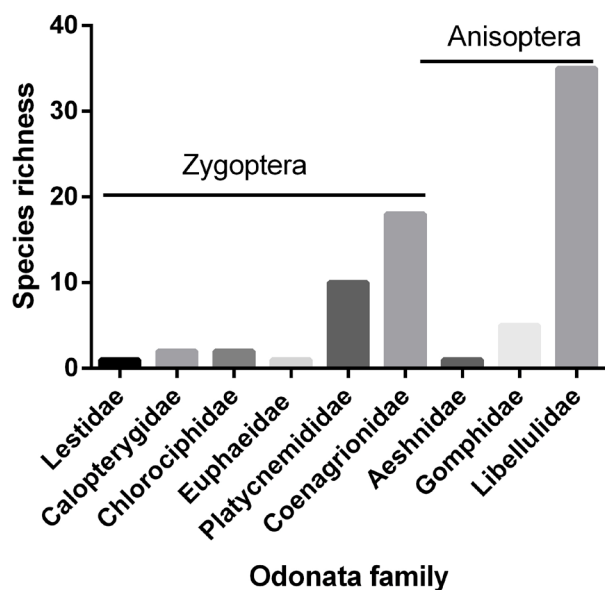


Figure 2. Number of Odonata species and their corresponding families recorded from the eastern region of Bangladesh in the present study

A total of 65 species belonging to eight families were recorded from the northeastern region. On the other hand, 52 species belonging to seven families were documented from the southeastern region. Among the 75 recorded species, 41 species were commonly recorded from the northeastern and southeastern regions. Twenty-three and 11 species were uniquely recorded from the northeastern and southeastern regions, respectively. Coenagrionidae and Libellulidae were the best-represented zygopteran and anisopteran families with 15 and 33 species, respectively. Similarly, in the southeastern region, Coenagrionidae and Libellulidae were the best-represented zygopteran and anisopteran families with 11 and 27 species, respectively.

Newly recorded odonates for Bangladesh

Calicnemia imitans Lieftinck, 1948 (Image 1A,B)

Calicnemia imitans is one of the most abundant species of odonates in the southeastern hilly streams of Bangladesh. They prefer streams associated with shady bushes for perching. This is the third recorded species of this genus from Bangladesh after *C. eximia* and *C. pulverulans*. I recorded this species based on the two male specimens collected from the Alutilla Cave, Khagrachari, Chittagong (23.085°N & 91.956°E, elevation 281m), on 02 June 2015 (specimen registration number ODO-008 and ODO-009). The length of the male abdomen is 29–31 mm and that of the hindwing is 20–22mm. This species can be distinguished by its body colouration and anal appendages. The ground colour of

male is black; orange and red colours are absent in the thorax; narrow straight blue ante-humeral stripe present, inferior is two third of the superior, tip of the superior is wide apart. This species was previously known from India, Laos, Myanmar, Thailand, and Vietnam (Fraser 1933; Hamalainen & Pinratana 1999; Cuong & Hoa 2007)

Prodasineura autumnalis (Fraser, 1922) (Image 1C,D)

I recorded this species based on two males and one female collected from the Kaptai National Park, Rangamati, Chittagong (22.497°N & 92.184°E, 51.4m), on 17 October 2014 (ODO-010, ODO-011 and ODO-012). I resighted this species later on 2 June 2015 from Richang Waterfalls, Khagrachari, Chittagong (23.110°N & 92.002°E, 78m), and on 04 June 2015 from Debota Pond, Khagrachari, Chittagong (23.085°N & 91.971°E, 52m). The length of the abdomen and hindwing of the males are 30–31 mm and 18–20 mm, respectively. *Prodasineura autumnalis* is superficially similar to *P. verticalis* and *P. sita*; however, they can be distinguished by the unmarked black thorax and the white-tipped inferior anal appendages (Image 1C). The females are found close to males and can be distinguished by their blue ante-humeral stripe (Image 1D). The species was previously known from China, India, Indonesia, Laos, Malaysia, Myanmar, Nepal, Singapore, Thailand, and Vietnam (Fraser 1933; Vick 1989; Hamalainen & Pinratana 1999; Wilson & Reels 2003; Orr 2005; Cuong & Hoa 2007; Wilson 2005; Tang et al. 2010). The present record extends its distribution to Bangladesh.

Megalogomphus smithii (Selys, 1854) (Image 1E)

Megalogomphus smithii was previously known from Assam, India, which is adjacent to the northeastern region of Bangladesh. Considering the similarity of habitats, this species was predicted to be present in Bangladesh too (Fraser 1934). I recorded this species based on one male collected from the Khadimnagar National Park, Sylhet, Bangladesh (24.951°N & 91.918°E, 56m), on 10 April 2015 (ODO-013). The lengths of the abdomen and hindwing in males are 53–55 mm and 42–44 mm, respectively. This species has a prominent M-shape marking in the thorax and can be easily distinguished from the other members of the genus by its yellow-marked black legs.

DISCUSSION

In the current study, the Odonata fauna of the eastern region of Bangladesh was documented. A total of 75 species from 45 genera was recorded. Among them, three species and one genus were recorded

Table 1. A list of the Anisoptera and Zygoptera species recorded in the current study from eastern Bangladesh. The species newly discovered from Bangladesh are indicated with asterisks (*). The species present in a particular area are shown by tick sign (✓) and the species absent are shown by cross mark (X).

	Species	Recorded from the north-eastern region	Recorded from the south-eastern region	Habitat feature
	Lestidae			
01	<i>Lestes praemorsus</i> Hagen in Selys, 1862	✓	X	Paddy field, pond
	Calopterygidae			
02	<i>Neurobasis chinensis</i> (Linnaeus, 1758)	X	✓	Stream, waterfalls
03	<i>Vestalis gracilis</i> (Rambur, 1842)	✓	✓	Forest, stream
	Chlorociphidae			
04	<i>Aristocypha quadrimaculata</i> (Selys, 1853)	✓	✓	Stream, waterfalls
05	<i>Libellago lineata</i> (Burmeister, 1839)	✓	✓	Stream
	Euphaeidae			
06	<i>Euphaea ochracea</i> Selys, 1859	X	✓	Stream
	Platycnemididae			
07	<i>Calicnemia imitans</i> Lieftinck, 1948*	X	✓	Stream
08	<i>Coelliccia bimaculata</i> Laidlaw, 1914	✓	X	Forest
09	<i>C. didyma</i> (Selys, 1863)	X	✓	Forest, stream
10	<i>Prodasineura autumnalis</i> (Fraser, 1922)*	X	✓	Stream
11	<i>P. laidlawii</i> (Förster in Laidlaw, 1907)	✓	X	Stream, forest
12	<i>P. verticalis</i> (Selys, 1860)	X	✓	Stream
13	<i>Onychargia atrocyana</i> Selys, 1865	✓	X	Lake, forest
14	<i>Copera marginipes</i> (Rambur, 1842)	✓	✓	Stream, forest
15	<i>C. vittata</i> (Selys, 1863)	✓	X	Stream
16	<i>Pseudocopera ciliata</i> (Selys, 1863)	✓	✓	Lake, marsh, pond
	Coenagrionidae			
17	<i>Agriocnemis clauseni</i> Fraser, 1922	✓	X	Forest stream
18	<i>A. femina</i> (Brauer, 1868)	✓	✓	Marsh, pond
19	<i>A. kalinga</i> Nair & Subramanian, 2014	✓	X	Lake, marsh, pond
20	<i>A. lacteola</i> Selys, 1877	✓	✓	Marsh, pond, paddy field
21	<i>A. pieris</i> Selys, 1877	X	✓	Marsh, pond
22	<i>A. pygmaea</i> (Rambur, 1842)	✓	✓	Marsh, pond
23	<i>Ceragrion cerinorubellum</i> (Brauer, 1865)	✓	✓	Lake, marsh, pond
24	<i>C. coromandelianum</i> (Fabricius, 1798)	✓	✓	Lake, marsh, pond
25	<i>C. olivaceum</i> Laidlaw, 1914	X	✓	Forest
26	<i>Ischnura aurora</i> (Brauer, 1865)	✓	✓	Marsh, paddy field
	Aeshnidae			
27	<i>I. rufostigma</i> Selys, 1876	✓	X	Pond, marsh, paddy field
28	<i>I. senegalensis</i> (Rambur, 1842)	✓	✓	Lake, marsh, pond
29	<i>Mortonagrion aborens</i> (Laidlaw, 1914)	✓	X	Ditch, pond
30	<i>Paracercion calamorum</i> (Ris, 1916)	✓	X	Lake
31	<i>P. malayanum</i> (Selys, 1876)	✓	X	Lake
32	<i>Pseudagrion microcephalum</i> (Rambur, 1842)	✓	✓	Lake, pond
33	<i>P. rubriceps</i> Selys, 1876	✓	✓	Lake, marsh, pond, stream
34	<i>P. spencei</i> Fraser, 1922	✓	X	Lake
	Gomphidae			
35	<i>Anax indicus</i> Lieftinck, 1942	✓	X	Lake, pond
36	<i>Ictinogomphus rapax</i> (Rambur, 1842)	✓	✓	Lake, pond
37	<i>Macrogomphus montanus</i> Selys, 1869	X	✓	Hilly lake
38	<i>M. robustus</i> (Selys, 1854)	✓	X	Forest stream
39	<i>Megalogomphus smithii</i> (Selys, 1854)*	✓	X	Forest stream
40	<i>Paragomphus lineatus</i> (Selys, 1850)	✓	✓	Forest edge, stream
	Libellulidae			
41	<i>Acisoma panorpoides</i> Rambur, 1842	✓	✓	Marsh, paddy field
42	<i>Aethriamanta brevipennis</i> (Rambur, 1842)	✓	✓	Forest edge, lake
43	<i>Brachydiplax chalybea</i> Brauer, 1868	✓	✓	Ditch, lake, pond
44	<i>B. farinosa</i> Kruger, 1902	✓	✓	Ditch, lake, pond
45	<i>B. sobrina</i> (Rambur, 1842)	✓	✓	Ditch, lake, pond
46	<i>Brachythemis contaminata</i> (Fabricius, 1793)	✓	✓	Ditch, lake, pond
47	<i>Cratilla lineata</i> (Brauer, 1878)	✓	✓	Forest
48	<i>Crocotthemis servilia</i> (Drury, 1770)	✓	✓	Pond, lake, stream
49	<i>Diplacodes nebulosa</i> (Fabricius, 1793)	✓	X	Marsh, paddy field
50	<i>D. trivialis</i> (Rambur, 1842)	✓	✓	Marsh, paddy field
51	<i>Hydrobasileus croceus</i> (Brauer, 1867)	✓	X	Forest
52	<i>Lathrecista asiatica</i> (Fabricius, 1798)	✓	X	Forest
53	<i>Neurothemis fulvia</i> (Drury, 1773)	✓	✓	Forest, lake
54	<i>N. intermedia</i> (Rambur, 1842)	✓	✓	Forest, marsh

	Species	Recorded from the north-eastern region	Recorded from the south-eastern region	Habitat feature
55	<i>N. tullia</i> (Drury, 1773)	✓	✓	Marsh, paddy field, pond
56	<i>Orthetrum chrysis</i> (Selys, 1891)	✓	✓	Forest
57	<i>O. glaucum</i> (Brauer, 1865)	X	✓	Forest, stream
58	<i>O. luzonicum</i> (Brauer, 1868)	✓	X	Forest
59	<i>O. pruinosum</i> (Burmeister, 1839)	✓	✓	Marsh, lake, pond, stream
60	<i>O. sabina</i> (Drury, 1770)	✓	✓	Marsh, lake, pond, stream
61	<i>O. triangulare</i> (Selys, 1878)	✓	✓	Forest, stream
62	<i>Palpopleura sexmaculata</i> (Fabricius, 1787)	✓	✓	Forest edge, Lake
63	<i>Pantala flavescens</i> (Fabricius, 1798)	✓	✓	Marsh, pond, paddy field
64	<i>Potamarcha congener</i> (Rambur, 1842)	✓	✓	Lake, pond

	Species	Recorded from the north-eastern region	Recorded from the south-eastern region	Habitat feature
65	<i>Rhodothemis rufa</i> (Rambur, 1842)	✓	✓	Lake, pond
66	<i>Rhyothemis variegata</i> (Linnaeus, 1763)	✓	✓	Marsh, paddy field
67	<i>Tetrathemis platyptera</i> Selys, 1878	✓	X	Forest
68	<i>Tholymis tillarga</i> (Fabricius, 1798)	✓	X	Lake, pond
69	<i>Tramea basilaris</i> (Palisot de Beauvois, 1805)	✓	✓	Forest edge
70	<i>T. virginia</i> (Rambur, 1842)	✓	X	Lake
71	<i>Trithemis aurora</i> (Burmeister, 1839)	✓	✓	Hilly stream
72	<i>T. festiva</i> (Rambur, 1842)	✓	✓	Stream
73	<i>T. pallidinervis</i> (Kirby, 1889)	✓	✓	Marsh, lake, stream
74	<i>Urothemis signata</i> (Rambur, 1842)	✓	✓	Marsh, lake, pond
75	<i>Zyxomma petiolatum</i> Rambur, 1842	✓	X	Forest

for the first time from Bangladesh. With the addition of those three species, the current checklist of the Odonata fauna of Bangladesh is raised to 108 species. The new record is an indication that the Odonata fauna in Bangladesh is poorly understood and demands more studies. Moreover, considering the habitat and Odonata fauna known from adjacent states of India, i.e., Assam, Meghalaya & West Bengal, and Myanmar, it can be predicted that more Odonata species are present in Bangladesh.

Regional checklists are indicators of the diversity, distribution range, and population fragmentation of a particular faunal community. Hence, updating regional checklists on a regular basis is a good practice to understand the conservation status of a species. In the current study, three species, *Agriocnemis clauseni*, *Pseudagrion spencei*, and *Tramea Virginia*, are newly added to the odonata fauna of the northeastern region of Bangladesh. In addition to that, the current study extended the distribution range of a few previously recorded species. The distribution range extension and new habitat allocation are particularly important to assess the global and national status of species. In the current study, the distribution range of two globally data deficient species is extended. Among them, *Macrogomphus robustus* was previously recorded from Lawachara National Park, Maulavibazar (Chowdhury & Mohiuddin 2011). The present record extends its distribution further north to the Khadimnagar

National Park, Sylhet. The other data deficient species, *Megalogomphus smithii*, was previously known from China, India, and Indonesia. The present study reported this species for the first time within the geographical area of Bangladesh. The individual number of this two data deficient species recorded from the current study is very low and thus long-term studies are essential to assess their population trends and distribution range.

In conclusion, the diverse Odonata fauna and newly recorded species of the eastern region indicate that the area may accommodate hitherto unknown species. Moreover, the current study suggests that more long-term surveys are required to annotate the Odonata fauna of Bangladesh to estimate their current status and to determine their conservation needs.

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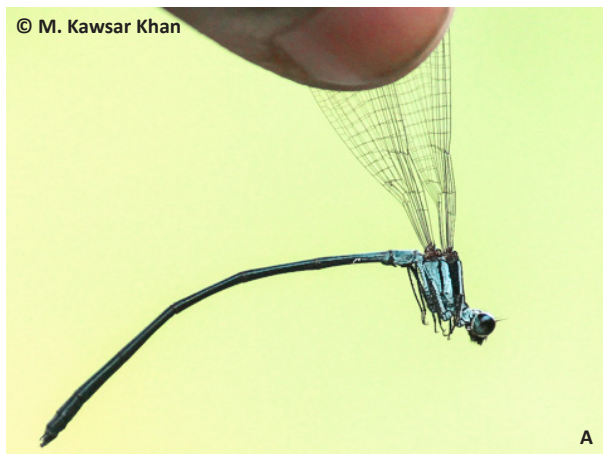


Image 1. Zygoptera and Anisoptera species newly recorded from Bangladesh in the present study.

A - *Calicnemia imitans* (male), B - *C. imitans* (female), C - *Prodasineura autumnalis* (male), D - *P. autumnalis* (male & female in tandem position), E - *Megalogramphus smithii* (male)

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