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Cover: Mugger Crocodile basking on the banks of Savitri River at Mahad in Maharashtra, India. © Utkarsha M. Chavan.



An annotated checklist of odonates of Amboli-Chaukul-Parpoli region showing new records for the Maharashtra State, India with updated state checklist

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Abstract: Amboli region, consisting Amboli, Chaukul, Nene, and Parpoli villages is one of the biodiversity rich areas in northern Western Ghats. We opportunistically surveyed odonates from the region and prepared an annotated checklist of 93 species belonging to 12 families. We report 15 Western Ghats endemic species and six new records for the State of Maharashtra. We further present an updated checklist of Odonata of Maharashtra state with a total of 144 species.

Keywords: Anisoptera, biodiversity, range extension, Sindhudurg, Western Ghats, taxonomy, zygoptera.

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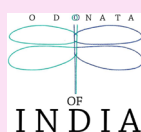
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Author details: DATTAPRASAD SAWANT is a Doctor by profession and completed his MD in Preventive and Social Medicine. He is a self taught photographer and discovered three odonata species new to science. HEMANT OGALÉ is a renowned butterfly and dragonfly expert and a master in micro photography. He has studied butterflies across the Western Ghats which resulted in documenting more than 100+ butterfly life cycles, several new host plant records and range extensions. RAKESH MAHADEV DEULKAR is a naturalist based in Amboli, Sindhudurg district, Maharashtra. He completed his masters in biodiversity. He is a kin bird, butterfly and odonata watcher with good photography skills.

Author contributions: All the three authors equally contributed in field surveys, odonata identification, data compilation, specimen collection and manuscript preparation.

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INTRODUCTION

The Western Ghats mountain range runs parallel to the west coast of peninsular India. The high human population density, changing use of landscape, pollution, natural disasters like landslides, increased anthropogenic interference and climate change have a negative impact in conserving biodiversity of this region. The Western Ghats has been thoroughly surveyed for odonates. Fraser (1933, 1934, 1936) and many others did comprehensive documentation in this region. Subramanian & Babu (2020) made a checklist of 196 odonates species of Western Ghats with Kerala having the most number of species. Regarding Maharashtra state, Tiple & Koparde (2015) recorded 134 species (see discussion). After that many species have been added to the list of Maharashtra with no formal efforts to compile them.

Amboli region is considered as one of the most biodiverse regions in Maharashtra with semi-evergreen forest and heavy rainfall (Satose et al. 2018). Amboli region consists of Amboli, Chaukul, Nene, and Parpoli villages, out of which Parpoli is located at the foothills of Western Ghats and remaining are located at the high altitude (100–1,100 m). The landscape around Amboli is heterogenous with patches of evergreen forest, riparian habitats, open lateritic plateaus with grasslands, and moist deciduous forests at mid and low elevations. Due to the unique location at the junction of northern and central Western Ghats with drastic variation in habitats, Amboli region harbors many spectacular odonate species. However, no attempt was made to document the Odonata fauna of this region. We surveyed Amboli region for two years and here we present an annotated checklist of 93 odonates with six new records for Maharashtra state. We also update the checklist of Maharashtra, which now contains 144 species.

MATERIAL AND METHODS

We opportunistically surveyed Amboli-Chaukul-Parpoli region of Sawantwadi Taluka, Sindhudurg District from August 2019 to August 2021 for odonates. Details of survey locations are given in Table 1 with photographs in Image 1. We photographed odonates and collected a few individuals from non-protected areas for the purpose of identification. All collected specimens are deposited in Research Collections, National Centre for Biological Sciences (NCBS), Bangalore, India (details of all specimens are given in Table 2). Field photographs were

taken with DSLR cameras and macro lenses (Canon Inc. and Nikon Inc., Japan). We identified odonates based on the Fraser (1933, 1934, 1936); Subramanian et al. (2018). Systematic arrangement of the species follows Kalkman et al. (2020). As the subspecies status of some species remains unresolved, the present checklist is up to the species level. Abbreviations in the text: S1–S10 = abdominal segments 1–10. Maps are created with QGIS v3.10.2 and Google Maps © 2021. Distribution maps are based on the data given by Subramanian et al. (2018) and Anonymous (2021a, 2021b, 2021c).

RESULTS AND DISCUSSION

We recorded a total of 93 odonates belonging to 12 families, with family Libellulidae having the highest number of species (38 species), followed by family Coenagrionidae (20 species) (see Table 6; Images 2–6). Detailed checklist of odonates with their International Union for Conservation of Nature (IUCN) Red List of Threatened Species status is given in Table 3. According to IUCN Red List Version 2021–2, one species is Vulnerable (VU), one is Near Threatened (NT), and six are Data Deficient (DD). Out of 93 species, 15 species are endemic to the Western Ghats (Subramanian et al. 2018; Kalkman et al. 2020; Bhakare et al. 2021). We also report six species for the first time in Maharashtra State which are the northernmost range extensions for the respective species (see Table 4; Image 7). Taxonomical and distributional notes on these six species are as follows:

1. ***Protosticta sanguinostigma* Fraser, 1922.** Hemant Ogale photographed this Western Ghats endemic damselfly in a hill stream of Nene village on 6.vi.2021 (Image 2c). Three males were observed resting in bushes out of which one male was collected. It was identified by a robust, pointed spine of cerci (Image 2d); brown synthorax with bluish stripes, and blue mark on S8 with narrow black line on dorsum. Earlier, the species was known from Goa, Karnataka, Kerala, and Tamil Nadu (Subramanian et al. 2018). Thus, *P. sanguinostigma* is reported from Maharashtra state for the first time with distribution range extension in northern Western Ghats (Image 7b).

2. ***Cyclogomphus flavoannulatus* Rangnekar et al., 2019.** Hemant Ogale photographed a small sized female Gomphid in Amboli on 02.x.2011. The species was identified as *C. flavoannulatus* female based on absence of yellow 'Y'-shaped mark on synthorax and basal yellow annular rings on abdominal segments



Image 1. Locations: a—Riverine habitat with wetland, Amboli | b—Seasonal ponds, Amboli | c—Hill stream, Amboli | d—Hill river, Amboli | e—Riverine habitat, Nene | f—Hill stream, Chaukul | g—Plateau lake, Chaukul | h—Rocky hill stream, Chaukul | i—Forested stream, Parpoli. © a, h—i—Hemant Ogale; b—g—Dattaprasad Sawant.

Table 1. Survey locations (all locations fall in Sawantwadi Taluka, Sindhudurg District, Maharashtra).

	Location	Latitude	Longitude	Altitude (in meter)	Habitat
01	Amboli	15.9647 °N	74.0036 °E	690	High altitude streams, wetlands and seasonal ponds
02	Chaukul	15.9283 °N	74.0388 °E	800	High altitude streams, wetlands and plateau lake
03	Dabhil	15.8969 °N	73.9330 °E	190	Low altitude forested stream
04	Nene	15.926 0°N	74.0223 °E	800	High altitude riverine habitat
05	Parpoli	15.9542 °N	73.9771 °E	100	Low altitude forested stream

Table 2. Details of collected specimens.

	Specimen deposited at	Voucher code	Species	Sex	Preservation method
01	NCBS	BN825	<i>Protosticta sanguinostigma</i>	Male	Dry only
02	NCBS	BN806	<i>Euphaea thosegharensis</i>	Male	Dry only
03	NCBS	BN805	<i>Bradinopyga konkanensis</i>	Male	Dry only
04	NCBS	BN807	<i>Idionyx saffronata</i>	Male	Dry only
05	NCBS	BN808	<i>Idionyx saffronata</i>	Female	Dry only
06	NCBS	BN827	<i>Macromidia donaldi</i>	Male	Dry only
07	NCBS	BN828	<i>Macromidia donaldi</i>	Female	Dry only

Table 3. Checklist of odonates of Amboli-Chaukul-Parpoli region, Sindhudurg District.

	Scientific name	Authority	IUCN Red List status	Image
	Suborder: Zygoptera Selys, 1854			
	Family: Lestidae Calvert, 1901			
01	<i>Lestes concinnus</i>	Hagen in Selys, 1862	LC	-
02	<i>Lestes elatus</i>	Hagen in Selys, 1862	LC	2a
03	<i>Lestes viridulus</i>	Rambur, 1842	LC	2b
	Family: Platystictidae Kennedy, 1920			
04	<i>Protosticta sanguinostigma</i> **	Fraser, 1922	VU	2c-d
	Family: Calopterygidae Selys, 1850			
05	<i>Neurobasis chinensis</i>	(Linnaeus, 1758)	LC	2e
06	<i>Vestalis apicalis</i>	Selys, 1873	LC	2f
07	<i>Vestalis gracilis</i>	(Rambur, 1842)	LC	2g
	Family: Chlorocyphidae Cowley, 1937			
08	<i>Heliocypha bisignata</i>	(Hagen in Selys, 1853)	LC	2h
09	<i>Libellago indica</i>	(Fraser, 1928)	NE	2i
	Family: Euphaeidae Yakobson & Bainchi, 1905			
10	<i>Euphaea fraseri</i> ^h	(Laidlaw, 1920)	LC	2j
11	<i>Euphaea pseudodispar</i> ^h	Sadasivan & Bhakare, 2021	NE	2k
12	<i>Euphaea thosegharensis</i> ^h	Sadasivan & Bhakare, 2021	NE	2l
	Family: Platycnemididae Yakobson & Bainchi, 1905			
13	<i>Caconeura ramburi</i>	(Fraser, 1922)	DD	2m
14	<i>Copera marginipes</i>	(Rambur, 1842)	LC	2n
15	<i>Copera vittata</i>	Selys, 1863	LC	2o
16	<i>Disparoneura quadrimaculata</i>	(Rambur, 1842)	LC	2p
17	<i>Elatoneura tetrica</i> ^h	(Laidlaw, 1917)	LC	2q
18	<i>Prodasineura verticalis</i>	(Selys, 1860)	LC	2r
	Family: Coenagrionidae Kirby, 1890			
19	<i>Aciagrion approximans</i>	Fraser, 1921	LC	3a
20	<i>Aciagrion occidentale</i>	Laidlaw, 1919	LC	3b
21	<i>Aciagrion pallidum</i>	Selys, 1891	LC	3c
22	<i>Agriocnemis pieris</i>	Laidlaw, 1919	LC	3d
23	<i>Agriocnemis pygmaea</i>	(Rambur, 1842)	LC	3e
24	<i>Agriocnemis splendidissima</i>	Laidlaw, 1919	LC	3f
25	<i>Amphiallagma parvum</i>	Selys, 1876	LC	3g
26	<i>Ceriagrion cerinorubellum</i>	(Brauer, 1865)	LC	3h
27	<i>Ceriagrion chromothorax</i> ^h	Joshi & Sawant 2019	NE	3i
28	<i>Ceriagrion coromandelianum</i>	(Fabricius, 1798)	LC	3j
29	<i>Ceriagrion olivaceum</i>	Laidlaw, 1914	LC	3k
30	<i>Ceriagrion rubiae</i>	Laidlaw, 1916	NE	3l
31	<i>Ischnura rubilio</i>	Selys, 1876	LC	3m
32	<i>Ischnura senegalensis</i>	Rambur, 1842	LC	3n
33	<i>Mortonagrion varralli</i>	Fraser, 1920	LC	3o
34	<i>Pseudagrion decorum</i>	Rambur, 1842	LC	3p
35	<i>Pseudagrion indicum</i> ^h	Fraser, 1924	LC	3q

	Scientific name	Authority	IUCN Red List status	Image
36	<i>Pseudagrion malabaricum</i>	Fraser, 1924	LC	3r
37	<i>Pseudagrion microcephalum</i>	(Rambur, 1842)	LC	4a
38	<i>Pseudagrion rubriceps</i>	Selys, 1876	LC	4b
Suborder Anisoptera Selys, 1854				
Family: Aeshnidae Leach, 1815				
39	<i>Anaciaeschna jaspidea</i>	(Burmeister, 1839)	LC	-
40	<i>Anax ephippiger</i>	(Burmeister, 1839)	LC	4c
41	<i>Anax guttatus</i>	(Burmeister, 1839)	LC	4d
42	<i>Anax immaculifrons</i>	Rambur, 1842	LC	4e
43	<i>Gynacantha dravida</i>	Lieftinck, 1960	LC	4f
44	<i>Gynacantha millardi</i>	Fraser, 1920	LC	4g
Family: Gomphidae Rambur, 184				
45	<i>Cyclogomphus flavoannulatus**</i>	Rangnekar et al 2019	NE	4h
46	<i>Gomphidia kodaguensis*</i>	Fraser, 1923	DD	4i
47	<i>Ictinogomphus rapax</i>	(Rambur, 1842)	LC	4j
48	<i>Macrogomphus wynaadicus*</i>	Fraser, 1924	DD	4k
49	<i>Megalogomphus hanningtoni**</i>	(Fraser, 1923)	NT	4l
50	<i>Melligomphus acinaces**</i>	(Laidlaw, 1922)	DD	4m
51	<i>Paragomphus lineatus</i>	(Selys, 1850)	LC	4n
Family: Macromiidae Needham, 1903				
52	<i>Epophthalmia vittata</i>	Burmeister, 1839	LC	4o
53	<i>Macromia cingulata</i>	Rambur, 1842	LC	4p
Family: Libellulidae Leach, 1815				
54	<i>Acisoma panorpoides</i>	Rambur, 1842	LC	4q
55	<i>Brachydiplax sobrina</i>	Rambur, 1842	LC	-
56	<i>Brachythemis contaminata</i>	(Fabricius, 1793)	LC	4r
57	<i>Bradinopyga geminata</i>	(Rambur, 1842)	LC	5a
58	<i>Bradinopyga konkanensis</i>	Joshi & Sawant, 2020	NE	5b
59	<i>Cratilla lineata</i>	(Brauer, 1878)	LC	5c
60	<i>Crocothemis servilia</i>	(Drury, 1770)	LC	5d
61	<i>Diplacodes lefebvrii</i>	(Rambur, 1842)	LC	5e
62	<i>Diplacodes trivialis</i>	(Rambur, 1842)	LC	5f
63	<i>Epithemis mariae**</i>	(Laidlaw, 1915)	LC	5g
64	<i>Hylaeothemis apicalis</i>	Fraser, 1926	DD	5h
65	<i>Indothemis carnatica</i>	Fabricius, 1798	LC	-
66	<i>Lathrecista asiatica</i>	(Fabricius, 1798)	LC	5i
67	<i>Neurothemis fulvia</i>	(Drury, 1773)	LC	5j
68	<i>Neurothemis intermedia</i>	(Rambur, 1842)	LC	5k
69	<i>Neurothemis tullia</i>	(Drury, 1773)	LC	5l
70	<i>Onychothemis testacea</i>	Laidlaw, 1902	LC	5m
71	<i>Orthetrum chrysis</i>	(Selys, 1891)	LC	5n
72	<i>Orthetrum glaucum</i>	(Brauer, 1865)	LC	5o
73	<i>Orthetrum luzonicum</i>	(Brauer, 1868)	LC	5p
74	<i>Orthetrum pruinsum</i>	(Burmeister, 1839)	LC	5q

	Scientific name	Authority	IUCN Red List status	Image
75	<i>Orthetrum sabina</i>	(Drury, 1770)	LC	5r
76	<i>Orthetrum taeniolatum</i>	(Schneider, 1845)	LC	6a
77	<i>Orthetrum triangulare</i>	(Selys, 1878)	LC	6b
78	<i>Palpopleura sexmaculata</i>	(Fabricius, 1787)	LC	6c
79	<i>Pantala flavescens</i>	(Fabricius, 1798)	LC	6d
80	<i>Potamarcha congener</i>	(Rambur, 1842)	LC	6e
81	<i>Rhodothermis rufa</i>	(Rambur, 1842)	LC	-
82	<i>Tetrathemis platyptera</i>	Selys, 1878	LC	6f
83	<i>Tholymis tillarga</i>	(Fabricius, 1798)	LC	6g
84	<i>Tramea basilaris</i>	(Palisot de Beauvois, 1805)	LC	6h
85	<i>Tramea limbata</i>	(Desjardins, 1832)	LC	6i
86	<i>Trithemis aurora</i>	(Burmeister, 1839)	LC	6j
87	<i>Trithemis festiva</i>	(Rambur, 1842)	LC	6k
88	<i>Trithemis kirbyi</i>	Selys, 1891	LC	6l
89	<i>Trithemis pallidinervis</i>	(Kirby, 1889)	LC	6m
90	<i>Zygonyx iris</i>	Selys, 1869	LC	6n
91	<i>Zyxomma petiolatum</i>	Rambur, 1842	LC	6o
Genera incertae sedis				
92	<i>Idionyx saffronata</i> **	Fraser, 1924	DD	6p-q
93	<i>Macromidia donaldi</i> **	(Fraser, 1924)	LC	6r

DD—Data Deficient | LC—Least Concern | NE—Not Evaluated | NT—Near Threatened | VU—Vulnerable | *—New records for the Maharashtra State | #—Species endemic to Western Ghats.

(Image 4h). The species was known from Kerala and Goa (Rangnekar et al. 2019). This observation is the first record from Maharashtra state with distributional range extension for the species (Image 7c).

3. *Megalogomphus hannyngtoni* (Fraser, 1923). Hemant Ogale photographed a large sized male Gomphid in Amboli on 9.vi.2021. It was identified by its large size; long and sharp pointed caudal appendages with 'sabre'-like appearance; apple green markings on black synthorax, and prominent yellow markings on S8–10 (Image 4l). This 'Near Threatened' Western Ghats endemic dragonfly was earlier known from Goa, Karnataka, Kerala, and Odisha (Subramanian 2011; Subramanian et al. 2018). Present record is the first from Maharashtra state and also extends the distribution range of *M. hannyngtoni* (Image 7d).

4. *Melligomphus acinaces* (Laidlaw, 1922). Hemant Ogale photographed a male of medium sized Gomphid, resting on rocks in Parpoli stream on 30.xi.2019. It was easily identified by its 'claw'-like caudal appendages with paraprocts longer than cerci (Image 4m). Koparde et al. (2014) recorded similar individuals from Parpoli and Verle villages. They wrongly

identified the species as *Lamelligomphus nilgiriensis* (= *Onychogomphus nilgiriensis*). Tiple & Koparde (2015) retained the same record in the checklist of Maharashtra. After close examination of photographs provided by Koparde et al. (2014), we identified the male as *M. acinaces*. Dattaprasad Sawant photographed a male in Shahapur Taluka, Thane District in 2018 which is another record of this species in Maharashtra state. Earlier the species was known from Gujrat, Karnataka, and Kerala (Rathod et al. 2016; Subramanian et al. 2018) (Image 7e). Our records fill the distribution gap for *M. acinaces*.

5. *Epithemis mariae* (Laidlaw, 1915). Hemant Ogale and Dattaprasad Sawant observed many individuals of *E. mariae* in Amboli, Chakul and Nene villages (Image 5g). This medium sized Libellulid can be easily identified by its bright red coloured proximal abdominal segments. This Western Ghats endemic dragonfly was reported by Sathe & Bhusnar (2010) from Kolhapur, but omitted by Tiple & Koparde (2015) due to absence of taxonomic identity or spatial distribution. Here we confirmed its presence in Maharashtra state with photographic evidence (Image 7f). The species can be easily seen in riverine habitats from mid-August to

Table 4. List of Odonata species added in the checklist of Maharashtra since 2015.

	Species	Family	Reference
01	<i>Lestes concinnus</i> Hagen in Selys, 1862	Lestidae	Dow (2017); Anonymous (2021d)
02	<i>Lestes patricia</i> Fraser, 1924	Lestidae	Bhakare et al. (2020)
03	<i>Lestes praemorsus</i> Hagen in Selys, 1862	Lestidae	Mujumdar et al. (2020); Koli et al. (2021)
04	<i>Platylestes platystylus</i> Rambur, 1842	Lestidae	Mujumdar et al. (2020)
05	<i>Protosticta sanguinostigma</i> Fraser, 1922	Platystictidae	Present Study
06	<i>Libellago indica</i> (Fraser, 1928)	Chlorocyphidae	Subramanian et al. (2018); Present Study
07	<i>Euphaea pseudodispar</i> Sadasivan & Bhakare, 2021	Euphaeidae	Bhakare et al. (2021); Present Study
08	<i>Euphaea thosegharensis</i> Sadasivan & Bhakare, 2021	Euphaeidae	Bhakare et al. (2021); Present Study
09	<i>Dysphaea ethela</i> Fraser, 1924	Euphaeidae	Personal observations by Dattaprasad Sawant at Hadpid, Devgad Taluka, Maharashtra.
10	<i>Melanoneura bilineata</i> Fraser, 1922	Platycnemididae	Koli and Dalvi (2021)
11	<i>Aciagrion approximans</i> (Selys, 1876)	Coenagrionidae	Subramanian et al. (2018); Present Study
12	<i>Agriocnemis keralensis</i> Peters, 1981	Coenagrionidae	Koli et al. (2021)
13	<i>Ceriagrion chromothorax</i> Joshi & Sawant 2019	Coenagrionidae	Joshi and Sawant (2019)
14	<i>Ischnura rubilio</i> Selys, 1876	Coenagrionidae	Subramanian et al. (2018); Present Study
15	<i>Gynacantha khasiaca</i> MacLachlan, 1896	Aeshnidae	Mujumdar et al. (2020); Koli et al. (2021)
16	<i>Cyclogomphus flavoannulatus</i> Rangnekar et al 2019	Gomphidae	Present Study
17	<i>Merogomphus longistigma</i> Fraser, 1922	Gomphidae	Payra et al. (2022)
18	<i>Megalogomphus hannyngtoni</i> (Fraser, 1923)	Gomphidae	Present Study
19	<i>Melligomphus acinaces</i> (Laidlaw, 1922)	Gomphidae	Present Study
20	<i>Bradinopyga konkanensis</i> Joshi & Sawant, 2020	Libellulidae	Joshi and Sawant (2019); Present Study
21	<i>Epithemis mariae</i> (Laidlaw, 1915)	Libellulidae	Present Study
22	<i>Hylaeothemis apicalis</i> Fraser, 1926	Libellulidae	Subramanian et al. (2018); Present Study
23	<i>Macrodiplax cora</i> (Brauer, 1867)	Libellulidae	Anonymous (2021e)
24	<i>Idionyx saffronata</i> Fraser, 1924	Genera incertae sedis	Present Study
25	<i>Macromidia donaldi</i> (Fraser, 1924)	Genera incertae sedis	Payra et al. (2022); Present Study. Payra et al. (2022) enlisted this species in family Synthemistidae. However Kalkman et al. (2020) consider this species to be belonged to Genera incertae sedis.

October.

6. *Idionyx saffronata* Fraser, 1924. Hemant Ogale collected a pair of *Idionyx* sp. from Amboli on 10.vi.2021 (Image 6p). Later it was confirmed as *I. saffronata* based on the shape of caudal appendages of male. Paraprocts are trifid with a broad apical portion (Image 6q). Genus *Idionyx* is distributed till Goa state in the Western Ghats but not reported from Maharashtra state (Subramanian et al. 2018). We confirm the presence of *I. saffronata* in Maharashtra with distributional range extension for the species (Image 7g).

Despite being one of the most biodiverse regions in the northern Western Ghats, no efforts were taken for documentation of Odonata fauna of Amboli-Chaukul-Parpoli region. Due to the unique location of Amboli, it was speculated to have many endemic odonates. Out of total number of species we reported, ~16% are endemic

to the Western Ghats, highlighting the rich biodiversity of the region with need of conservation of natural habitat. Western Ghats and adjacent areas in Sindhudurg district are facing tremendous anthropogenic pressure in the form of habitat loss. Change in existing landscape may lead to the disappearance of species which are extremely seasonal and localized in a small geographic area.

Maharashtra state has varied biogeography due to which it harbors several species of flora and fauna. The state has been thoroughly studied in terms of odonates. Tipale & Koparde (2015) combined various checklists and made a comprehensive database of odonates. They recorded a total of 134 species from 11 families. Since then, many species have been reported and discovered from Maharashtra. Table 4 gives detailed information of species added to Odonata fauna of Maharashtra. Citizen Science platforms such as Indian Odonata have

Table 5. List of Odonata species omitted from the checklist of Maharashtra due to various reasons.

	Species	Family	Reason
01	<i>Lestes thoracicus</i> (Laidlaw, 1920)	Lestidae	Dumont et al. (2017) synonymized <i>L. thoracicus</i> with <i>L. concinnus</i> .
02	<i>Lestes umbrinus</i> (Selys, 1891)	Lestidae	Dumont et al. (2017) synonymized <i>L. umbrinus</i> with <i>L. concinnus</i> .
03	<i>Aciagrion hisopa</i> (Selys, 1876)	Coenagrionidae	Joshi et al. (2016) showed that taxon <i>krishna</i> belongs to <i>A. approximans</i> and not to <i>A. hisopa</i> . Hence we include <i>A. approximans</i> in updated checklist
04	<i>Cercion dyeri</i> (Fraser, 1920)	Coenagrionidae	Weeker & Dumont (2004) synonymized <i>C. dyeri</i> with <i>Paracercion calamorum</i> .
05	<i>Ischnura aurora</i> (Brauer, 1865)	Coenagrionidae	Papazian et al. (2007) showed <i>I. a. aurora</i> is found in Australia and <i>I. a. rubilio</i> is found in the Indian Subcontinent and Iran. Kalkman et al. (2020) consider <i>I. rubilio</i> as a complete species.
06	<i>Anax imperator</i> (Leach, 1815)	Aeshnidae	Tiple & Koparde (2015) listed <i>A. imperator</i> from Nashik without any photographic or specimen evidence. However, it is distributed in Africa, Europe and North India. This record needs to be confirmed with either photo or specimen.
07	<i>Anormogomphus heteropterus</i> (Selys, 1854)	Gomphidae	Babu et al. (2009) recorded a female Gomphid from Aurangabad, Maharashtra and identified it as <i>A. heteropterus</i> . However, no male individual has been reported from the state since then. This species occurs in North India with no records from Western Ghats and nearby regions. Hence until the record of male individuals, we omit this species from the checklist of Maharashtra.
08	<i>Asiagomphus nilgircus</i> (Laidlaw, 1922)	Gomphidae	Sathe & Bhusnar (2010) mentioned <i>A. nilgircus</i> without any specimen or photographic evidence from Amba Reserve Forest. However, Subramanian et al. (2018) mentioned the distribution in Karnataka and Tamilnadu.
09	<i>Davidioides martini</i> (Fraser, 1924)	Gomphidae	Sathe & Bhusnar (2010) mentioned <i>D. martini</i> without any specimen or photographic evidence from Amba Reserve Forest. However, Subramanian et al. (2018) mentioned the distribution in Kerala only.
10	<i>Cyclogomphus vesiculosus</i> (Selys, 1873)	Gomphidae	Kalkman et al. (2020) synonymized <i>C. vesiculosus</i> with <i>C. ypsilon</i> .
11	<i>Onychogomphus nilgiriensis</i> (Fraser, 1922)	Gomphidae	Koparde et al. (2014) recorded <i>O. nilgiriensis</i> from Parpoli, which is a case of misidentification. The individual shown by Koparde et al. (2014) is actually <i>Melligomphus acinaces</i> .
12	<i>Hylaeothemis indica</i> (Fraser, 1946)	Libellulidae	Kalkman et al. (2020) synonymized <i>H. indica</i> with <i>H. apicalis</i> .
13	<i>Orthetrum anceps</i> (Schneider, 1845)	Libellulidae	Prasad (1996) reported this European species from Maharashtra. This species is very similar to <i>O. glaucum</i> , <i>O. luzonicum</i> and <i>O. taeniolatum</i> , and it cannot be identified without genital examination. Considering the known geographical range of <i>O. anceps</i> given by Boudot et al. (2013), we omit this record from the checklist of Maharashtra.
14	<i>Orthetrum testaceum</i> (Burmeister, 1839)	Libellulidae	Babu et al. (2009) reported this species from Pune. However, Subramanian et al. (2018) omitted this species from the checklist of Western Ghats. No other records are available from the state.
15	<i>Sympetrum hypomelas</i> (Selys, 1884)	Libellulidae	Kulkarni et al. (2012) mentioned <i>S. hypomelas</i> in the checklist of Maharashtra from Bhimashankar WS. However, Subramanian et al. (2018) mentioned this as a doubtful record. Considering the geographical range given by Subramanian & Dow (2010), we omit this species until any strong evidence is found.

Table 6. Family-wise distribution of Odonata species.

	Family	Amboli-Chaukul-Parpoli Region	Maharashtra State (updated)
01	Lestidae	02	06
02	Platystictidae	01	02
03	Calopterygidae	03	03
04	Chlorocyphidae	02	03
05	Euphaeidae	03	04
06	Platycnemididae	06	10
07	Coenagrionidae	20	28
08	Aeshnidae	06	10
09	Gomphidae	07	21
10	Macromiidae	02	06
11	Corduliidae	00	01
12	Libellulidae	38	48
13	Genera incertae sedis	02	02
	Total	93	144

contributed for understanding the distribution range of many odonates (Joshi et al. 2021). However, due to some taxonomic changes, a few species are omitted from the Odonata checklist. Details about such species and the reason for omission is given in Table 5. Hence the updated Odonata checklist of Maharashtra has 144 species from 13 families. Table 6 shows the taxonomic breakup with families arranged as per Kalkman et al. (2020).

Odonates are freshwater insects and need stable microhabitat for reproduction. The Western Ghats including Amboli region is now under constant threat of habitat loss resulting from anthropogenic activities. Systematic surveys are needed to document the overall biodiversity of this unique landscape which will ultimately help to make appropriate habitat conservation plans.



Image 2. Field images of: a—*Lestes elatus* | b—*Lestes viridulus* | c—*Protosticta sanguinostigma* | d—Caudal appendages of *Protosticta sanguinostigma* | e—*Neurobasis chinensis* | f—*Vestalis apicalis* | g—*Vestalis gracilis* | h—*Heliocypha bisignata* | i—*Libellago indica* | j—*Euphaea fraseri* | k—*Euphaea pseudodispar* | l—*Euphaea thosegharensis* | m—*Caconeura ramburi* | n—*Copera marginipes* | o—*Copera vittata* | p—*Disparoneura quadrimaculata* | q—*Elatoneura tetrica* | r—*Prodasineura verticalis*. © a–r—Hemant Ogale.

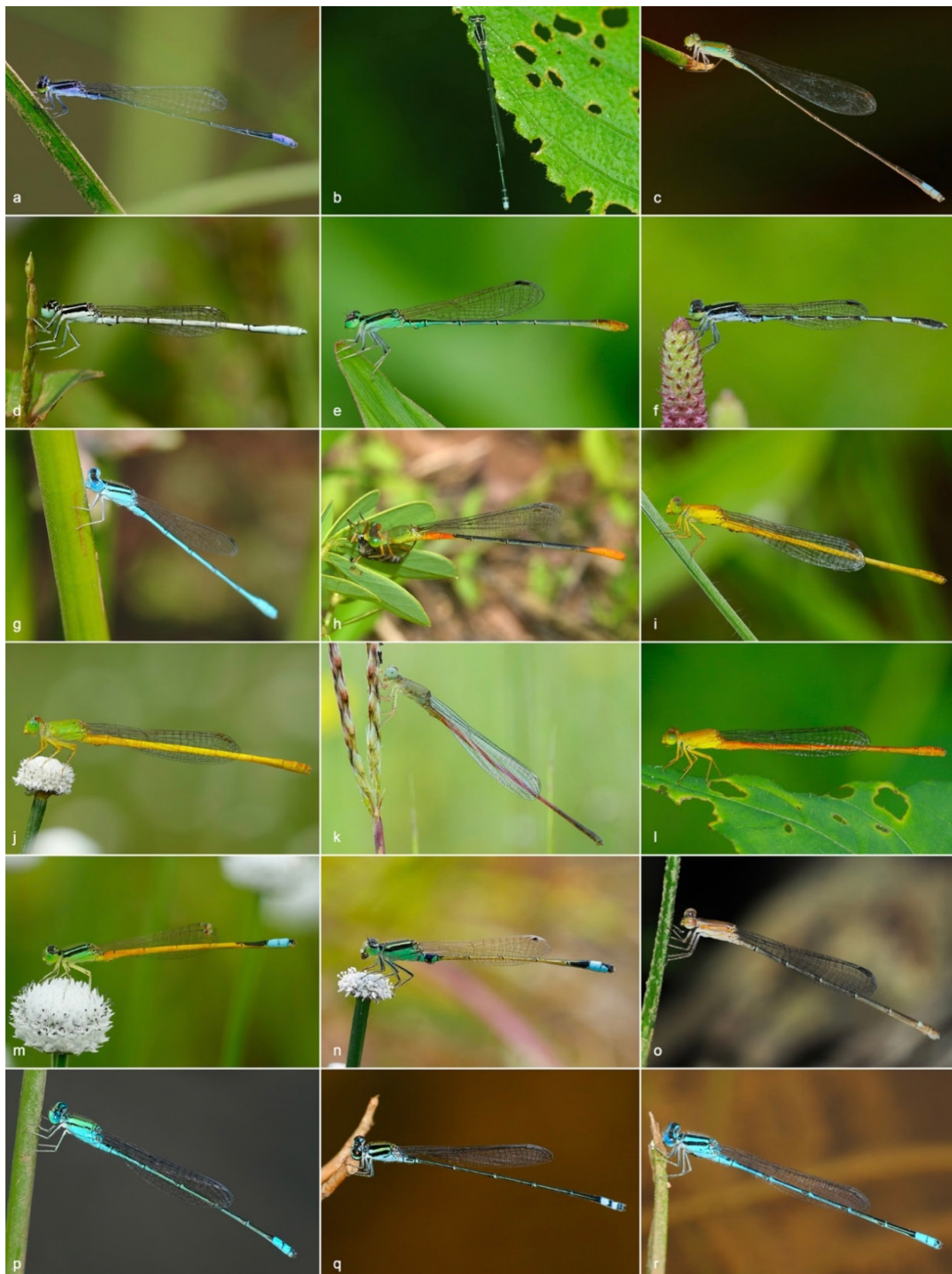


Image 3. Field images of: a—*Aciagrion approximans* | b—*Aciagrion occidentale* | c—*Aciagrion pallidum* | d—*Agriocnemis pieris* | e—*Agriocnemis pygmaea* | f—*Agriocnemis splendidissima* | g—*Amphiallagma parvum* | h—*Ceriagrion cerinorubellum* | i—*Ceriagrion chromothorax* | j—*Ceriagrion coromandelianum* | k—*Ceriagrion olivaceum* | l—*Ceriagrion rubiae* | m—*Ischnura rubilio* | n—*Ischnura senegalensis* | o—*Mortonagrion varralli* | p—*Pseudagrion decorum* | q—*Pseudagrion indicum* | r—*Pseudagrion malabaricum*. © a–r—Hemant Ogale.

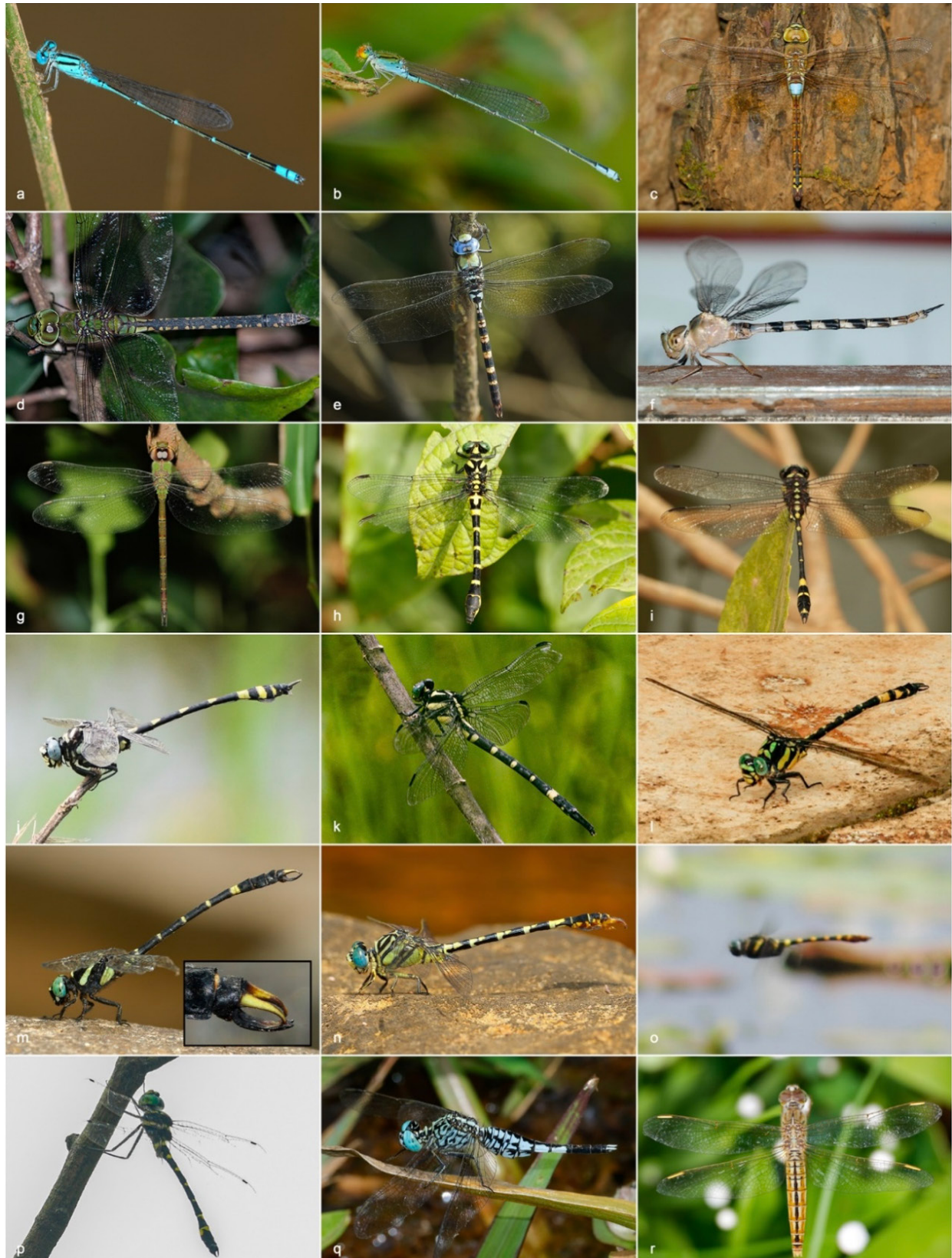


Image 4. Field images of: a—*Pseudagrion microcephalum* | b—*Pseudagrion rubriceps* | c—*Anax ephippiger* | d—*Anax guttatus* | e—*Anax immaculifrons* | f—*Gynacantha dravida* | g—*Gynacantha millardi* | h—*Cyclogomphus flavoannulatus* | i—*Gomphidia kodaguensis* | j—*Ictinogomphus rapax* | k—*Macrogomphus wynaadicus* | l—*Megalogomphus hannyngtoni* | m—*Melligomphus acinaces* | n—*Paragomphus lineatus* | o—*Epophthalmia vittata* | p—*Macromia cingulate* | q—*Acisoma panorpoides* | r—*Brachythemis contaminata*. © a–r—Hemant Ogale.



Image 5. Field images of: a—*Bradinopyga geminata* | b—*Bradinopyga konkanensis* | c—*Cratilla lineata* | d—*Crocothemis servilia* | e—*Diplacodes lefebvrii* | f—*Diplacodes trivialis* | g—*Epithemis mariae* | h—*Hylaeothemis apicalis* | i—*Lathrecista asiatica* | j—*Neurothemis fulvia* | k—*Neurothemis intermedia* | l—*Neurothemis tullia* | m—*Onychothemis testacea* | n—*Orthetrum chrysis* | o—*Orthetrum glaucum* | p—*Orthetrum luzonicum* | q—*Orthetrum pruinsum* | r—*Orthetrum sabina*. © a—r—Hemant Ogale.



Image 6. Field images of: a—*Orthetrum taeniolatum* | b—*Orthetrum triangulare* | c—*Palpopleura sexmaculata* | d—*Pantala flavescens* | e—*Potamarcha congener* | f—*Tetrathemis platyptera* | g—*Tholymis tillarga* | h—*Tramea basilaris* | i—*Tramea limbata* | j—*Trithemis aurora* | k—*Trithemis festiva* | l—*Trithemis kirbyi* | m—*Trithemis pallidinervis* | n—*Zygonyx iris* | o—*Zyxomma petiolatum* | p—*Idionyx saffronata* | q—Caudal appendages of *Idionyx saffronata* | r—*Macromidia donaldi*. © a–r—Hemant Ogale.

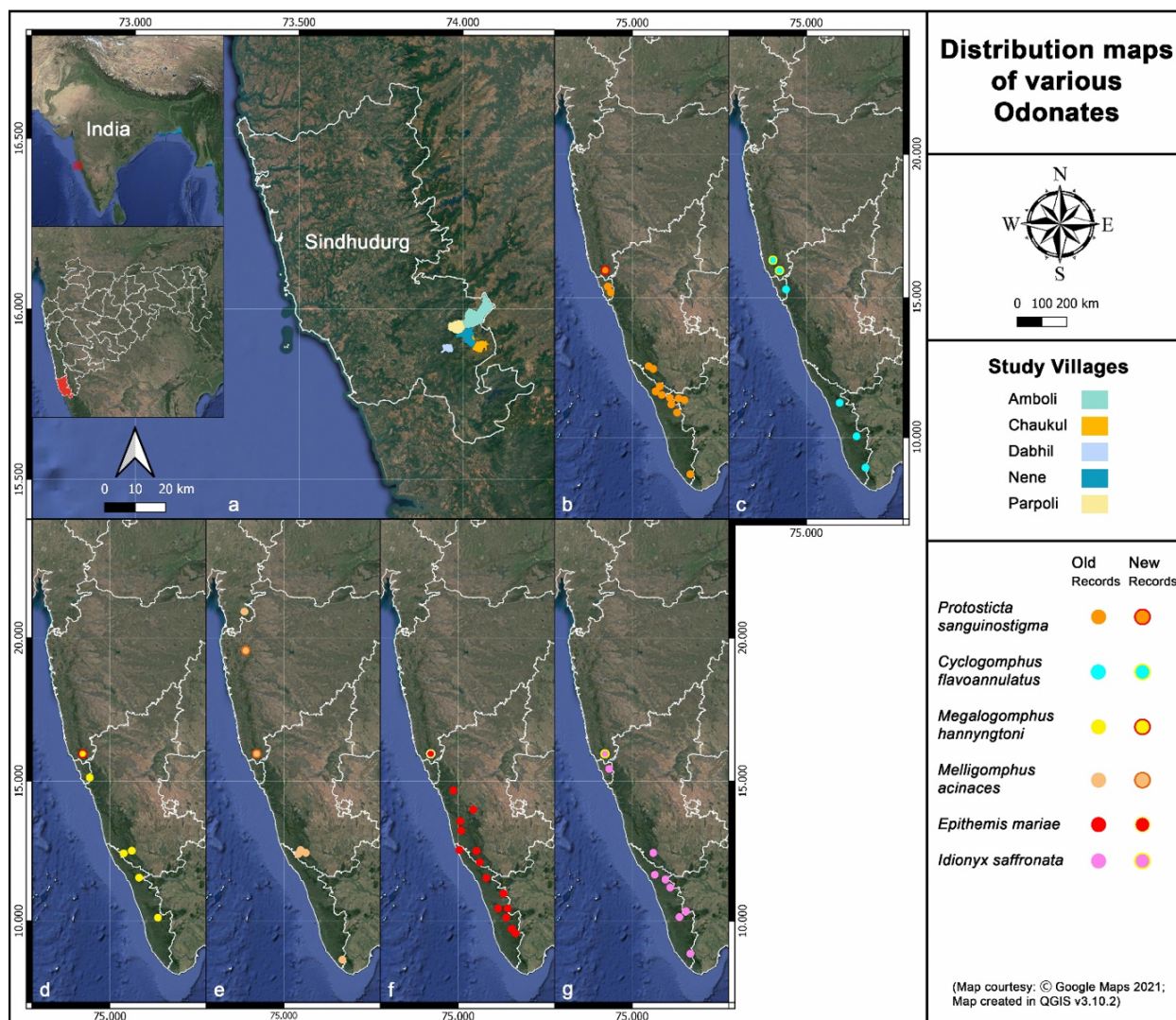


Image 7. Distribution maps: a—Study villages in Sindhudurg District | b—*Protosticta sanguinostigma* | c—*Cyclogomphus flavoannulatus* | d—*Megalogomphus hannyngtoni* | e—*Melligomphus acinaces* | f—*Epithemis mariae* | g—*Idionyx saffronata*.

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