

# Dragonflies and damselflies (Insecta: Odonata) of Chhattisgarh, India

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**ABSTRACT:** The present study on the Odonata (Insecta) of Chhattisgarh, India, documents eighty-five species including thirteen new records to the state. Three species — *Cyclogomphus heterostylus* Selys, 1854, *Macrogomphus seductus* Fraser, 1926 (Gomphidae) and *Zygonyx iris iris* Selys, 1869 (Libellulidae) — are recorded for the first time from central India. The paper discusses the geographical and habitat-wise distribution of Odonata of Chhattisgarh.

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#### Introduction

The order Odonata (dragonflies and damselflies), comprising three suborders Anisoptera, Anisozygoptera and Zygoptera are one of ancient group of Insects. Within India, 463 species belonging to 140 genera have been recorded representing 8% of the world known species (Subramanian 2009). The larvae and adults are predatory and very important biocontrol agents for insect pests (Khaliq 2002). Moreover, studies across the world have shown that they are good indicators of ecosystem health and ideal surrogate taxa for identifying freshwater biodiversity hotspots for conservation (Hart *et al.* 2014).

Odonata diversity is quite known from the Central India; however the information on protected areas and districts of Chhattisgarh was scanty. This survey was carried out from 2011-2013 in different districts and protected areas in different seasons to assess the Odonata diversity of this state. Previous studies on Odonate fauna of this state were partly done along with few protected areas and districts of Madhya Pradesh from which Chhattisgarh was carved out in 2000. Mitra (1995) recorded 22 species of Odonata from Indravati Tiger Reserve, Bastar. Prasad (1996) reported 66 species of Odonates from Bastar district. Mishra (2007) documented 70 species from Madhya Pradesh and Chhattisgarh which was updated to 106 species recently (Tiple and Chandra, 2013). This present paper deals with the Odonata specimens collected, observed and studied during survey of few Districts and Protected areas of Chhattisgarh.

#### **MATERIALS AND METHODS**

The present study was carried out in connection with the projects entitled "Faunal Diversity of Protected Areas of Chhattisgarh" and "District-Wise Faunal Diversity of Chhattisgarh" funded by Chhattisgarh, CAMPA, Govt. of India. The survey was done through extensive collection of Odonata specimens, direct observation and photographic record in 8 districts and 6 protected areas (Table 1) of Chhattisgarh from June, 2011 to May, 2013 (Figure 1).

Survey were conducted seasonally mainly in pre-monsoon (January to May) and monsoon (June to September). Specimens were collected using butterfly net and by handpicking. Collected specimens were killed by gently pressing the thorax and kept dry in insect envelope and processed for preservation and identification. The collected specimens were examined under Leica EZ4 HD Binocular Microscope and Leica Stereo Zoom Microscope (Leica M205A). Smaller damselfly specimens were examined and kept in 70% ethanol after identification. Species were identified following keys of Fraser (1933, 1934, 1936) and Mitra (2002). Identified specimens were deposited in National Zoological Collections of Zoological Survey of India, Kolkata.

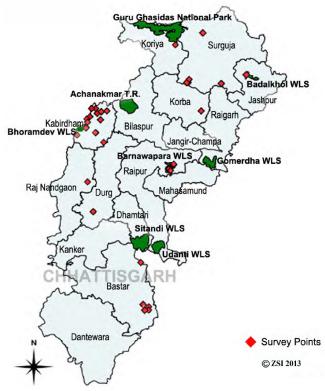


FIGURE 1. Map of Chhattisgarh showing the study area.

TABLE 1. Study Area with Forest Cover, Average annual Temperature and Annual Rainfall (Nag, 2007).

STUDY AREA		DISTRICT	ANNUAL	AVERAGE	DAILY RAINFALL (mm)				
DISTRICTS	PROTECTED AREAS	FOREST COVER (km²)	RAINFALL (mm)	ANNUAL TEMPERATURE (°C)	MAX. (JULY TO SEPT)	MIN.(JAN TO MAR)			
Bastar	_	7112.3	1398.2	>27	350	6 to 10			
Bilaspur	AWLS	2987.5	1130.3	25-27	400	12			
Durg	_	863.2	1757.2	25-27	400	10			
Jashpur	BDWLS	2752.3	1544.4	23-25	>400	20			
Kabirdham	BHWLS	1852.2	935	25-27	400	12			
Korba	_	4187.3	2091	23-25	>400	12			
Koriya	GGNP	3529.3	1376.7	23-25	>400	>18			
Raipur	BRWLS	4412.7	977.5	25-27	400	12			
Surguja	TPWLS	8654.9	1531.6	23-25	>400	>18			

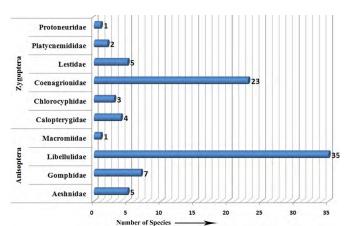
Abbreviation used are: AWLS, Achanakmar Wildlife Sanctuary; BDWLS, Badalkhol Wildlife Sanctuary; BHWLS, Bhoramdev Wildlife Sanctuary; BRWLS, Barnawapara Wildlife Sanctuary; GGNP, Guru Ghasidas National Park; TPWLS, Tamor Pingla Wildlife Sanctuary.

#### **RESULTS**

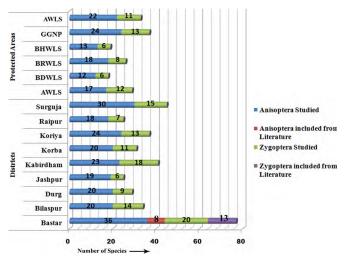
The present study conducted in 8 districts and 6 protected areas of Chhattisgarh, revealed the identification of 68 Odonata species belonging to 44 genera and 10 families, among which 13 species representing 12 genera are newly recorded from the state (Table 3) including 3 species, viz., Cyclogomphus heterostylus Selys, 1854, Macrogomphus seductus Fraser, 1926 (Gomphidae) and Zygonyx iris iris Selys, 1869 (Libellulidae) new records to the Central India. This study resulted in listing the Odonata fauna of this state represented by 85 species belonging to 49 genera and 10 families (Table 2) which are more than 18% of the Indian fauna. Among the recorded species family Libellulidae is most dominant in number having 35 individuals and least are the Macromiidae and Protoneuridae with only one species each (Figure 2). Among the districts surveyed Bastar hosts the maximum number of species studied, followed by Surguja and Kabirdham and least number of species were studied from Jashpur and Raipur (Figure 3).

### DISCUSSION

Chhattisgarh is the most forested state of India having 44% land under forest cover. There are four major forest types, namely Tropical Moist Deciduous, Tropical Dry Deciduous, Tropical Thorn and Subtropical Broadleaf Hill Forests. Forests are largely distributed in the north and in the southern parts of the State. Teak and Sal are the two most important forest formations of the State (Nag 2007). During monsoon the odonates were abundant in flooded crop-fields, grasslands and swamps, but as most part of the state endures a very hot summer, crop-fields and number of wetlands dry up except for a few large ponds and streams. Libellulidae and Coenagrionidae were most abundant families to be found in almost every habitat. Good populations of Lestes umbrinus Selys, 1891 and Lestes viridulus Rambur, 1842 (both family Lestidae) were seen in grasslands beside water bodies; Copera vittata Selys, 1863 and Copera marginipes (Rambur, 1842) (both family Platycnemididae) were mainly found near shaded forest streams. In the dry summer, few aeshnids, namely Anax immaculifrons Rambur, 1842 and Gynacantha byadera Selys, 1891, and calopterygids, namely *Vestalis apicalis* Selys, 1873 and *Vestalis gracilis* (Rambur, 1842), were seen to concentrate near the small waterholes and small rocky streams inside forests. Few individuals of family Chlorocyphidae, namely *Rhinocypha bisignata* Hagen in Selys, 1853 and *Libellago lineata* (Burmeister, 1839), were also found near rocky streams. The list of species reported from different habitats such as grassland and paddy fields near water bodies (I), Ponds and swamps of villages (II), Deep forests (III), Waterholes inside forest (IV), rocky and shaded forest streams (V) and rocky riverbeds (VI) are included in the Table 2. Further study of both the larval and adult stages in the remote areas in the forests and rocky streams may enrich the species list.



**FIGURE 2.** Chart showing number of Odonata species from different families identified during the study.



**FIGURE 3.** Chart showing number of species recorded from different districts and protected areas of Chhattisgarh.

**TABLE 2**. List of Odonata recorded from Chhattisgarh (+ indicates species reported herein; \* indicates species recorded from literature and the citations beside the species indicate the respective literatures.).

	DISTRICTS							PROTECTED AREAS								
TAXON	BASTAR	BILASPUR	DURG	JASHPUR	KABIRDHAM	KORBA	KORIYA	RAIPUR	SURGUJA	AWLS	BDWLS	BRWLSW	BHWLS	GGNP	TPWLS	HABITAT TYPE
Order Odonata									<u> </u>							
Suborder Anisoptera																
Family Aeshnidae																
Anaciaeschna jaspidea (Burmeister, 1839)									+							I
Anax guttatus (Burmeister, 1839)	+	+	+	+	+	+	+		+	+				+	+	II
Anax immaculifrons Rambur, 1842	+				+			+	+			+				IV
Gynacantha bayadera Selys, 1891	+				+	+										IV
Hemianax ephippiger (Burmeister, 1839)									+							I
Family Gomphidae																
Cyclogomphus heterostylus Selys, 1854	+															I
Cyclogomphus ypsilon Selys, 1854	+								+							I
Ictinogomphus rapax (Rambur, 1842)	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	II
Macrogomphus seductus Fraser, 1926	+															III
Microgomphus torquatus (Selys, 1854)	+															III
Paragomphus lineatus (Selys, 1850)	+			+	+		+		+					+	+	I
Family Libellulidae																
Acisoma panorpoides Rambur, 1842	+	+	+		+	+	+	+	+	+		+	+	+	+	I
Brachydiplax sobrina (Rambur, 1842)*	+		d, 1996	)												1 11
Brachythemis contaminata (Fabricius, 1793)	+	+	+		+	+	+	+	+	+		+	+	+	+	I, II VI
Bradinopyga geminata (Rambur, 1842)	+								+						+	
Canacina gigantea (Brauer, 1867)	+					+			+							III
Cratilla lineata Foerster, 1903 Crocothemis servilia (Drury, 1770)	+	+	+		+				+							I, II I, II
Diplacodes lefebvrii (Rambur, 1842)	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	1, 11 II
Diplacodes nebulosa (Fabricius, 1793)	+		+				-							т.		I
Diplacodes trivialis (Rambur, 1842)	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	I, II
Indothemis limbata (Selys, 1891)*	+		1995;	Prasa	d 199	· 5	·	·			•	·	•	•		1, 11
Lathrecista asiatica (Fabricius, 1798)	+	······	+	+	u, 1))	9		+				+				III
Neurothemis fulvia (Drury, 1773)	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	III
Neurothemis intermedia (Rambur, 1842)	+		+	+			+		+					+	+	V
Neurothemis tullia (Drury, 1773)	+			+			+							+		I, II
Orthetrum glaucum (Brauer, 1865)	+	+			+		+		+					+	+	III, V
Orthetrum luzonicum (Brauer, 1868)	+	+		+	+	+	+		+					+	+	I, V
Orthetrum pruinosum (Burmeister, 1839)	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	I, II
																I, II, V
Orthetrum sabina (Drury, 1770)	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
Orthetrum taeniolatum (Schneider, 1845)	+		+		+	+	+		+					+	+	VI
Palpopleura sexmaculata (Fabricius, 1787)	+						+							+		II
Pantala flavescens (Fabricius, 1798)	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	I, II
Potamarcha congener (Rambur, 1842)	+				+				+							I, II
Rhyothemis variegata (Linnaeus, 1763)	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	I, II
Tholymis tillarga (Fabricius, 1798)	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	I, II, V
Tramea basilaris (Palisot de Beauvois, 1805)	+	+	+	+	+	+	+	+	+	+	+	+		+		II
Tramia limbata (Desjardins, 1832)		_						+				+				II
Tramea virginia (Rambur, 1842)*	+	Prasac	d, 1996	)												
Trithemis aurora (Burmeister, 1839)	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	I, II
Trithimis festiva (Rambur, 1842)	+	+	1 1000	. +	+		+	+	+	+		+	+	+	+	V, VI
Trithemis kirbyi Selys, 1891*	+		d, 1996	)												
Trithemis pallidinervis (Kirby, 1889)	+	+				+		+	+	+		+				I, II
Urothemis signata (Rambur, 1842) Zygonyx iris iris Selys, 1869	+	+	+	_		+				+	+					I I, III
	_			+			,L		+		+				+	1, 111 I, II
Zyxomma petiolatum Rambur, 1842	+						+		+						+	1, 11
Family Macromiidae Macromia cingulata Rambur, 1842	+						_									V
Suborder Zygoptera	+						+							+	+	٧
Family Calopterygidae																
Neurobasis chinensis (Linnaeus, 1758)				+							+					IV
Vestalaria smaragdina (Selys, 1879)*	+							Mitra	1995-1	Prasad,						1 V
Vestalis apicalis Selys, 1873		+			+		+	+ +	+	+ +	_,,0	+		+	+	IV
Vestalis gracilis (Rambur, 1842)	+	+			+			+	-			+		+		IV

Table 2. List of Odonata recorded from Chhattisgarh (\* indicates species reported herein; \* indicates species recorded from literature).

	DISTRICTS							PROTECTED AREAS					PE			
TAXON	BASTAR	BILASPUR	DURG	JASHPUR	KABIRDHAM	KORBA	KORIYA	RAIPUR	SURGUJA	AWLS	BDWLS	BRWLSW	BHWLS	GGNP	TPWLS	HABITAT TYPE
Family Chlorocyphidae																
Rhinocypha bisignata Hagen in Selys, 1853									+						+	V
Rhinocypha trifasciata (Selys, 1853)*	+	Prasad	, 1996													
Libellago lineata (Burmeister, 1839)	+			+							+					IV
Family Coenagrionidae																
Aciagrion hisopa (Selys, 1876)*	+	Mitra,	1995;	Prasad,	1996											
Aciagrion occidentale Laidlaw, 1919*	+	Prasad	, 1996													
Aciagrion pallidum Selys, 1891*	+	Mitra,	1995;	Prasad,	1996											
Agriocnemis dabreui Fraser, 1919*	+	Mitra,	1995;	Prasad,	1996											
Agriocnemis lacteola Selys, 1877	+	+	+		+	+	+	+	+	+		+	+	+	+	I, II
Agriocnemis pieris Laidlaw, 1919*	+	Prasad	, 1996													
Agriocnemis pygmaea (Rambur, 1842)	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	I, II
Agriocnemis splendidissima Laidlaw, 1919	+	+					+		+	+				+		I, II
Ceriagrion coromandelianum (Fabricius, 1798)	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	I, II
Ceriagrion olivaceum Laidlaw, 1914*	+	Prasad	, 1996													
Ceriagrion rubiae Laidlaw, 1916			•	+					+		+					I, II, IV
Enallagma parvum Selys, 1876	+	+	+	+	+	+	+	+	+	+	+	+	+	+		I, II
Ischnura aurora (Brauer, 1865)	+	+	+	+	+	+	+		+	+	+		+	+	+	Í, II
Ischnura rufostigma Selys, 1876	+								+							Í, II
Ischnura senegalensis (Rambur, 1842)	+				+										+	Í, II
Paracercion malayanum (Selys, 1876)*	+	Mishra	2007													-,
Onychargia atrocyana (Selys, 1865)	+	+	+							+						II
Pseudagrion australasiae Selys, 1876*	+	Prasad														
Pseudagrion decorum (Rambur, 1842)	+	+	+		+	+	+		+	+				+	+	I, II, V
Pseudagrion hypermelas Selys, 1876*	+	Prasad			•	•			•					•	•	2, 22, 1
Pseudagrion microcephalum (Rambur, 1842)	+	114544	+		+											I, II
Pseudagrion rubiceps (Selys, 1876)	+	+	•		+	+	+	+	+	+		+	+	+		I, II
Rhodischnura nursei (Morton, 1907)	+	·			+	•			•			•	•			I, II
Family Lestidae					•											1, 11
Lestes elatus Hagen in Selys, 1862*	+	Prasad	1996													
Lestes praemorsus Hagen in Selys, 1862	•	114344	, 1770		+											IV
Lestes thoracicus Laidlaw, 1920*	+	Prasad	1996													1 V
Lestes umbrinus Selys, 1891	+	TTasau	, 1770		+	_	_		_					_		I
Lestes umbrinus Seiys, 1691 Lestes viridulus Rambur, 1842	+		+		+	+	~		+	+		+		т	+	I
Family Platycnemididae	т	т	т		т	т				т		т			г	1
Copera marginipes (Rambur, 1842)	+				+	+	+		+					+	+	V
Copera maryimpes (Kambui, 1842) Copera vittata Selys, 1863	+	+			+	+	+		+	+				+	+	v V
Family Protoneuridae	+	+			т	т	7		т	т				т	т	V
ranny riotoneuriuae																V, VI
Disparoneura quadrimaculata (Rambur, 1842)	+				+											v, v1

## LITERATURE CITED

Catling, P. M. 2005. A potential for the use of dragonfly (Odonata) diversity as a bio-indicator of the efficiency of sewage lagoons. *The Canadian Field–Naturalist* 119(2): 233–236 (http://canadianfieldnaturalist.ca/index.php/cfn/article/view/111).

Fraser, F.C. 1933. Fauna of British India, Odonata 1. London: Taylor and Francis. 423 pp.

Fraser, F.C. 1934. Fauna of British India, Odonata 2. London: Taylor and Francis. 398 pp.

Fraser, F.C. 1936. Fauna of British India, Odonata 3. London: Taylor and Francis. 461 pp.

Hart, L.A., M.B. Bowker, W. Tarboton and C.T. Downs. 2014. Species composition, distribution and habitat types of Odonata in the iSimangaliso Wetland Park, KwaZulu-Natal, South Africa and the associated conservation implications. *PLoS ONE* 9(3): e92588 (doi: 10.1371/journal.pone.0092588)

Khaliq, A. 2002. Potential of dragonflies as bio-control agents of insect pest of rice; pp. 1–26, in: Kumar, A. (ed.). Current Trends in Odonatology. Delhi: Daya Publishing House.

Mishra, S.K. 2007. Insecta: Odonata; pp. 245–272, in: The Director (ed.). Fauna of Madhya Pradesh (Including Chhattisgarh). State Fauna Series, 15(1). Kolkata: Zoological Survey of India. Mitra, T.R. 1995. Insecta: Odonata; pp. 31–34, in: The Director (ed.). Fauna of Indravati Tiger Reserve. Fauna of Conservation Areas. No. 6. Kolkata: Zoological Survey of India.

Mitra, T.R. 2002. Geographical distribution of Odonata (Insecta) of eastern India. *Memoirs of the Zoological Survey of India* 19(1): 1–208.

Nag, P. 2007. State Atlas of Chhattisgarh. Kolkata: National Atlas and Thematic Mapping Organisation, Department of Science and Technology, Government of India. 39 pp. + 34 pl.

Prasad, M. 1996. Studies on the Odonata fauna of Bastar, Madhya Pradesh, India. *Records of the Zoological Survey of India* 95: 165–213.

Subramanian, K.A. 2009. A Checklist of Odonata of India. Zoological Survey of India, Accessible at http://zsi.gov.in/checklist/Odonata\_Indica\_151209.pdf. Captured on 15 July 2012.

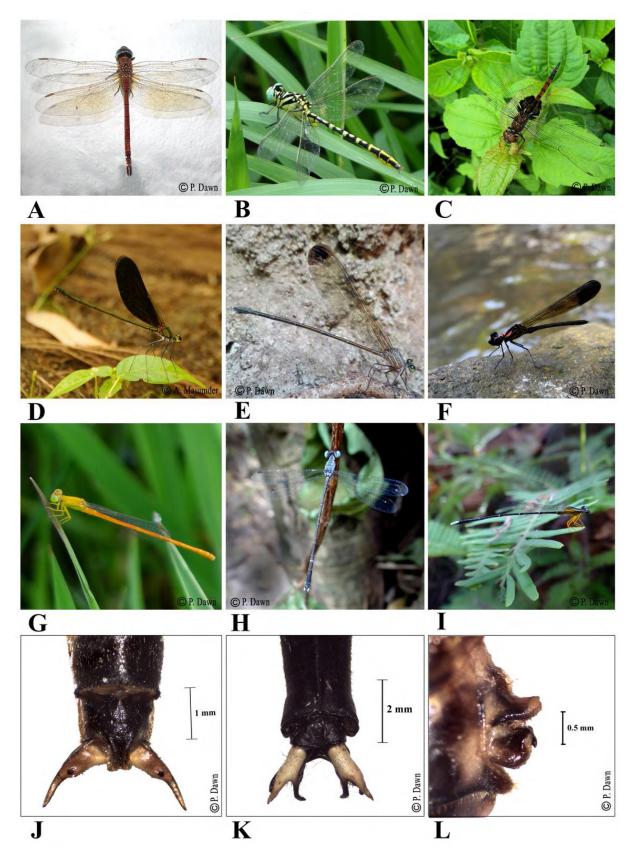
Tiple, A. and K. Chandra. 2013. Dragonflies and damselflies (Insecta, Odonata) of Madhya Pradesh and Chhattisgarh states, central India. *Journal Care4Nature* 1(1): 1–10.

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 TABLE 3. Odonata species reported new to the fauna of Chhattisgarh (\* indicates new records to Central India).

SPECIES	DISTRICT	LOCATION	LATITUDE, LONGITUDE & ALTITUDE (m)	ALTITUDE (m)	COLLECTION/ OBSERVATION DATE	FIGURE	VOUCHER SPECIMEN REG. NO.
Anaciaeshna jaspidea	Surguja	Mainpat, Forest Rest House	22°49′03.8″ N, 83°17′06.7″ E	1137	12.ix.2012	Figure 4A	4980/H13
Cyclogomphus heterostylus*	Bastar	Jagdalpur, Dharmpur beat	19°06′01.9″ N, 81°59′02″ E	550	24.vi.2012	Figure 4B	4912/H13
Cyclogomphus ypsilon	Surguja	Mainpat, Stream Near Forest Rest House	22°49′08″ N, 83°17′15″ E	1060	12.ix.2012	Figure 4J	4913/H13
Macrogomphus seductus*	Bastar	Jagdalpur, Tirathgarh FRH	18°54′47″ N, 81°51′58″ E	604	25.vii.2012	Figure 4K	4914/H13
Microgomphus torquatus	Bastar	Jagdalpur, Titirgaon	19°07′22″ N, 81°58′03.8″ E	555	20.vi.2012	_	4915/H13
Tramea limbata	Raipur	Barnawapara WLS camp	21°24′00″ N, 82°25′11″ E	322	1.x.2011	Figure 4C	4916/H13
Zygonyx iris iris*	Jashpur	Badalkhol WLS, Dega Degi Nala	22°56′17″ N, 83°44′49″ E	577	27.v.2012	Figure 4L	4917/H13
Neurobasis chinensis	Jashpur	Badalkhol WLS, Dega Degi Nala	22°56′17″ N, 83°44′49″ E	577	27.v.2012	Figure 4D	Field photograph
Vestalis apicalis	Kabirdham	Rengakhar, Deodonga	22°01′27″ N, 80°58′34″ E	751	7.vi.2012	Figure 4E	4981/H13
Rhinocypha bisignata	Surguja	Tamor-Pingla WLS, Ramkola, Debijhariya	23°38′30″ N, 82°59′07.3″ E	556	15.v.2013	Figure 4F	4919/H13
Ceriagrion rubiae	Surguja	Mainpat, Stream Near Forest Rest House	22°49′08″ N, 83°17′15″ E	1060	12.ix.2012	Figure 4G	Field photograph
Lestes praemorsus	Kabirdham	Rengakhar, Deodonga	22°01′27″ N, 80°58′34″ E	751	7.vi.2012	Figure 4H	Field photograph
Copera vittata	Surguja	Tamor-Pingla WLS, Ramkola, Debijhariya	23°38′30″ N, 82°59′07.3″ E	556	15.v.2013	Figure 4I	4918/H13



**FIGURE 4.** Odonates newly recorded from Chhattisgarh. A. Anaciaeschna jaspidea (Burmeister) ( $\mathcal{E}$ ); B. Cyclogomphus ypsilon Selys ( $\mathcal{E}$ ); C. Tramia limbata (Desjardins) ( $\mathcal{E}$ ); D. Neurobasis chinensis (Linnaeus) ( $\mathcal{E}$ ); E. Vestalis apicalis Selys ( $\mathcal{E}$ ); F. Rhinocypha bisignata Hagen in Selys ( $\mathcal{E}$ ); G. Ceriagrion rubiae Laidlaw ( $\mathcal{E}$ ); H. Lestes praemorsus Hagen in Selys ( $\mathcal{E}$ ); I. Copera vittata Selys ( $\mathcal{E}$ ); J. Dorsal view of Anal appendages, Cyclogomphus heterostylus Selys ( $\mathcal{E}$ ); K. Dorsal view of Anal appendages, Macrogomphus seductus Fraser ( $\mathcal{E}$ ); L. Side view of Genitalia, Zygonyx iris iris Selys ( $\mathcal{E}$ ).