

Building evidence for conservation globally

Journal of Threatened Taxa



10.11609/jott.2022.14.9.21751-21902
www.threatenedtaxa.org

26 September 2022 (Online & Print)
14(9): 21751-21902
ISSN 0974-7907 (Online)
ISSN 0974-7893 (Print)

Open Access





ISSN 0974-7907 (Online); ISSN 0974-7893 (Print)

Publisher
Wildlife Information Liaison Development Society
www.wild.zooreach.org

Host
Zoo Outreach Organization
www.zooreach.org

No. 12, Thiruvannamalai Nagar, Saravanampatti - Kalapatti Road, Saravanampatti,
Coimbatore, Tamil Nadu 641035, India
Ph: +91 9385339863 | www.threatenedtaxa.org
Email: sanjay@threatenedtaxa.org

EDITORS

Founder & Chief Editor

Dr. Sanjay Molur

Wildlife Information Liaison Development (WILD) Society & Zoo Outreach Organization (ZOO),
12 Thiruvannamalai Nagar, Saravanampatti, Coimbatore, Tamil Nadu 641035, India

Deputy Chief Editor

Dr. Neelesh Dahanukar

Noida, Uttar Pradesh, India

Managing Editor

Mr. B. Ravichandran, WILD/ZOO, Coimbatore, India

Associate Editors

Dr. Mandar Paingankar, Government Science College Gadchiroli, Maharashtra 442605, India

Dr. Ulrike Streicher, Wildlife Veterinarian, Eugene, Oregon, USA

Ms. Priyanka Iyer, ZOO/WILD, Coimbatore, Tamil Nadu 641035, India

Dr. B.A. Daniel, ZOO/WILD, Coimbatore, Tamil Nadu 641035, India

Editorial Board

Dr. Russel Mittermeier

Executive Vice Chair, Conservation International, Arlington, Virginia 22202, USA

Prof. Mewa Singh Ph.D., FASc, FNA, FNAsc, FNAPsy

Ramanna Fellow and Life-Long Distinguished Professor, Biopsychology Laboratory, and
Institute of Excellence, University of Mysore, Mysuru, Karnataka 570006, India; Honorary
Professor, Jawaharlal Nehru Centre for Advanced Scientific Research, Bangalore; and Adjunct
Professor, National Institute of Advanced Studies, Bangalore

Stephen D. Nash

Scientific Illustrator, Conservation International, Dept. of Anatomical Sciences, Health Sciences
Center, T-8, Room 045, Stony Brook University, Stony Brook, NY 11794-8081, USA

Dr. Fred Pluthero

Toronto, Canada

Dr. Priya Davidar

Sigur Nature Trust, Chadapatti, Mavinahalla PO, Nilgiris, Tamil Nadu 643223, India

Dr. Martin Fisher

Senior Associate Professor, Battcock Centre for Experimental Astrophysics, Cavendish
Laboratory, JJ Thomson Avenue, Cambridge CB3 0HE, UK

Dr. John Fellowes

Honorary Assistant Professor, The Kadoorie Institute, 8/F, T.T. Tsui Building, The University of
Hong Kong, Pokfulam Road, Hong Kong

Prof. Dr. Mirco Solé

Universidade Estadual de Santa Cruz, Departamento de Ciências Biológicas, Vice-coordenador
do Programa de Pós-Graduação em Zoologia, Rodovia Ilhéus/Itabuna, Km 16 (45662-000)
Salobrinho, Ilhéus - Bahia - Brasil

Dr. Rajeev Raghavan

Professor of Taxonomy, Kerala University of Fisheries & Ocean Studies, Kochi, Kerala, India

English Editors

Mrs. Mira Bhojwani, Pune, India

Dr. Fred Pluthero, Toronto, Canada

Mr. P. Ilangoan, Chennai, India

Web Development

Mrs. Latha G. Ravikumar, ZOO/WILD, Coimbatore, India

Typesetting

Mrs. Radhika, ZOO, Coimbatore, India

Mrs. Geetha, ZOO, Coimbatore India

Fundraising/Communications

Mrs. Payal B. Molur, Coimbatore, India

Subject Editors 2019–2021

Fungi

Dr. B. Shivaraju, Bengaluru, Karnataka, India

Dr. R.K. Verma, Tropical Forest Research Institute, Jabalpur, India

Dr. Vatsavaya S. Raju, Kakatiya University, Warangal, Andhra Pradesh, India

Dr. M. Krishnappa, Jnana Sahyadri, Kuvempu University, Shimoga, Karnataka, India

Dr. K.R. Sridhar, Mangalore University, Mangalagangothri, Mangalore, Karnataka, India

Dr. Gunjan Biswas, Vidyasagar University, Midnapore, West Bengal, India

Plants

Dr. G.P. Sinha, Botanical Survey of India, Allahabad, India

Dr. N.P. Balakrishnan, Ret. Joint Director, BSI, Coimbatore, India

Dr. Shonil Bhagwat, Open University and University of Oxford, UK

Prof. D.J. Bhat, Retd. Professor, Goa University, Goa, India

Dr. Ferdinando Boero, Università del Salento, Lecce, Italy

Dr. Dale R. Calder, Royal Ontario Museum, Toronto, Ontario, Canada

Dr. Cleofas Cervancia, Univ. of Philippines Los Baños College Laguna, Philippines

Dr. F.B. Vincent Florens, University of Mauritius, Mauritius

Dr. Merlin Franco, Curtin University, Malaysia

Dr. V. Irudayaraj, St. Xavier's College, Palayamkottai, Tamil Nadu, India

Dr. B.S. Kholia, Botanical Survey of India, Gangtok, Sikkim, India

Dr. Pankaj Kumar, Kadoorie Farm and Botanic Garden Corporation, Hong Kong S.A.R., China

Dr. V. Sampath Kumar, Botanical Survey of India, Howrah, West Bengal, India

Dr. A.J. Solomon Raju, Andhra University, Visakhapatnam, India

Dr. Vijayasankar Raman, University of Mississippi, USA

Dr. B. Ravi Prasad Rao, Sri Krishnadevaraya University, Anantpur, India

Dr. K. Ravikumar, FRLHT, Bengaluru, Karnataka, India

Dr. Aparna Watve, Pune, Maharashtra, India

Dr. Qiang Liu, Xishuangbanna Tropical Botanical Garden, Yunnan, China

Dr. Noor Azhar Mohamed Shazili, Universiti Malaysia Terengganu, Kuala Terengganu, Malaysia

Dr. M.K. Vasudeva Rao, Shiv Ranjani Housing Society, Pune, Maharashtra, India

Prof. A.J. Solomon Raju, Andhra University, Visakhapatnam, India

Dr. Mandar Datar, Agharkar Research Institute, Pune, Maharashtra, India

Dr. M.K. Janarthanam, Goa University, Goa, India

Dr. K. Karthikeyan, Botanical Survey of India, India

Dr. Errol Vela, University of Montpellier, Montpellier, France

Dr. P. Lakshminarasimhan, Botanical Survey of India, Howrah, India

Dr. Larry R. Noblick, Montgomery Botanical Center, Miami, USA

Dr. K. Haridasan, Pallavur, Palakkad District, Kerala, India

Dr. Analinda Manila-Fajard, University of the Philippines Los Banos, Laguna, Philippines

Dr. P.A. Sinu, Central University of Kerala, Kasaragod, Kerala, India

Dr. Afroz Alam, Banasthali Vidyapith (accredited A grade by NAAC), Rajasthan, India

Dr. K.P. Rajesh, Zamorin's Guruvayurappan College, GA College PO, Kozhikode, Kerala, India

Dr. David E. Boufford, Harvard University Herbaria, Cambridge, MA 02138-2020, USA

Dr. Ritesh Kumar Choudhary, Agharkar Research Institute, Pune, Maharashtra, India

Dr. Navendu Page, Wildlife Institute of India, Chandrabani, Dehradun, Uttarakhand, India

Dr. Kannan C.S. Warrior, Institute of Forest Genetics and Tree Breeding, Tamil Nadu, India

Invertebrates

Dr. R.K. Avasthi, Rohtak University, Haryana, India

Dr. D.B. Bastawade, Maharashtra, India

Dr. Partha Pratim Bhattacharjee, Tripura University, Suryamaninagar, India

Dr. Kailash Chandra, Zoological Survey of India, Jabalpur, Madhya Pradesh, India

Dr. Ansie Dippenaar-Schoeman, University of Pretoria, Queenswood, South Africa

Dr. Rory Dow, National Museum of Natural History Naturalis, The Netherlands

Dr. Brian Fisher, California Academy of Sciences, USA

Dr. Richard Gallon, Llandudno, North Wales, LL30 1UP

Dr. Hemant V. Ghate, Modern College, Pune, India

Dr. M. Monwar Hossain, Jahangirnagar University, Dhaka, Bangladesh

Mr. Jatishwor Singh Irungbam, Biology Centre CAS, Branišovská, Czech Republic.

Dr. Ian J. Kitching, Natural History Museum, Cromwell Road, UK

For Focus, Scope, Aims, and Policies, visit https://threatenedtaxa.org/index.php/JoTT/aims_scope

For Article Submission Guidelines, visit <https://threatenedtaxa.org/index.php/JoTT/about/submissions>

For Policies against Scientific Misconduct, visit https://threatenedtaxa.org/index.php/JoTT/policies_various

continued on the back inside cover

Cover: *Pipistrellus tenuis* recorded during the small mammalian fauna study, Manipur, India. © Uttam Saikia.



INTRODUCTION

In the last few years, an increasing number of studies were published on the dragonflies and damselflies of Bhutan with numerous species being reported new to the country. The checklist published by Gyeltshen et al. (2017) included 92 species and that of Kalkman et al. (2020) contained 114 species. A further nine species were recorded by Gurung et al. (2021) bringing the total to 123 species. Rasaily et al. (2021) provided an overview of the odonates of Bhutan with a checklist, distribution maps, data on phenology, and altitudinal distribution for all species. The dragonfly and damselfly fauna of Bhutan compared to adjacent region in the eastern Himalaya, is relatively well known although it is likely that more species remain to be discovered. Most of the studies on Bhutanese odonates were carried out in non-protected areas with limited field survey periods and proximity to the main roads. Data on the occurrence of dragonflies and damselflies in the protected areas is scant in Bhutan. Here, we present distribution data collected in 2021 of 43 species of odonates from Trongsa and Zhemgang districts. Part of these records originate from the Jigme Singye Wangchuck National Park (JSWNP). These records include two species new to Bhutan.

MATERIALS AND METHOD

Opportunistic sampling was carried out from 23 April 2021 to 20 May 2021 during the pre-monsoon and 18 October 2021 to 05 November 2021 during the post-monsoon season in two districts—Trongsa and Zhemgang in central Bhutan (Figure 1)—along an altitudinal gradient stretching from 400 m to 2,800 m. The survey was conducted from 0900–1500 h in suitable habitats such as brooks, wetlands, ponds, paddy fields, and rivers. Odonates were photographed using a Nikon D5600 DSLR camera attached to Nikkor 70–300 mm zoom lens during the survey. Common species were identified in the field following Gyeltshen et al. (2017). Species which could not be identified in the field were captured using an insect sweep net and brought to the College of Natural Resources, Royal University of Bhutan lab for examination. All specimens collected from this study were deposited in the College of Natural Resources Museum. The specimens were examined under the microscope and were identified using the taxonomic monograph of Fraser (1933, 1934, 1936) and Karube (2002). All species identifications are based upon adult specimens except for two records of *Perissogomphus*

stevensi and one records of *Neurobasis chinensis* which were identified from larvae.

Abbreviations

DoFPS: Department of Forest and Park Services; FR: forest ranger; FW: forewing; HW: hindwing; JSWNP: Jigme Singye Wangchuck National Park; MG1–37: Locality 1 to 37; pt: pterostigma; S1–10: abdominal segment 1 to 10.

List of localities (Figure 1)

All observations were made by the first author unless specified otherwise. Some localities were visited multiple times and in these cases a, b, c, or d indicates the date on which they were visited (see list of localities). 'X' denotes those cases where a locality was visited multiple times but the date on which a species was recorded is unknown.

(MG1) Zhemgang district, Tingtibi, Dakpay Chhu, shallow stream with thick vegetation by the side of marshy land, (27.152121°N, 90.693088°E, altitude 555 m), 25 October 2021.

(MG2) Zhemgang district, Tingtibi, streams with thick lowland vegetations, (27.142237°N, 90.692395°E, altitude 558 m), (a) 26 April 2021; (b) 25 October 2021.

(MG3) Zhemgang district, Takabi Chhu stream, tall tree canopies with thick riparian vegetation, (27.146026°N, 90.687720°E, altitude 561 m), 21 October 2021.

(MG4) Zhemgang, Tingtibi, Takabi Chhu, stream with thick vegetation and tall tree canopy habitat, (27.144651°N, 90.687412°E, altitude 483 m), (a) 12 May 2021; (b) 21 October 2021.

(MG5) Zhemgang district, Tingtibi, Maidagang Chhu streams with dense riparian vegetation, (27.127601°N 90.715601°E, altitude 534 m), (a) 25 April 2021; (b) 22 October 2021.

(MG6) Zhemgang district, way to Berti from Tingtibi, along the roadside pools with bushy vegetation, (27.150037°N, 90.684622°E, altitude 599 m), (a) 27 March 2021; (b) 25 October 2021.

(MG7) Zhemgang district, Tingtibi, common along stream side vegetation, (27.139521°N, 90.698527°E, altitude 789 m), 26 October 2021.

(MG8) Zhemgang district, way to Berti from Tingtibi, wetlands and slow flowing streams, (27.150343°N, 90.670788°E, altitude 571 m), (a) 25 April 2021; (b) 25 October 2021.

(MG9) Zhemgang, Berti, slow flowing stream near the Berti fishing community, (27.160623°N, 90.654518°E, altitude 662 m), 25 October 2021.

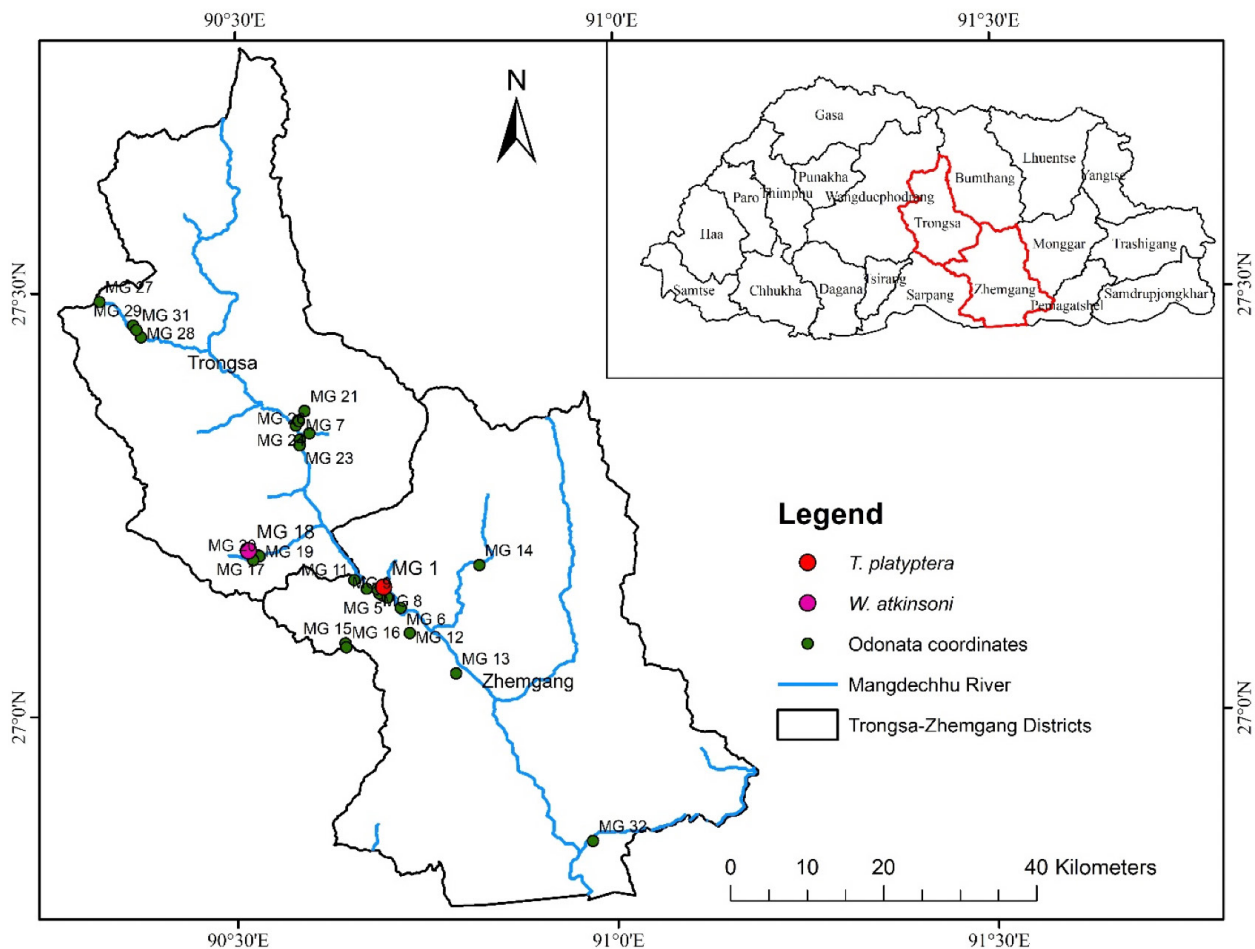


Figure 1. Survey localities along Mangdechhu basin, Jigme Singye Wangchuck National Park, Trongsa and Zhemgang districts.

(MG10) Zhemgang district, way to Manas, standing water, wetland and slow flowing streams, (27.049563°N, 90.787988°E, altitude 1,476 m), (a) 28 April 2021; (b) 23 October 2021.

(MG11) Zhemgang district, on stream side riparian vegetation, (27.177540°N, 90.819670°E, altitude 1,539 m), (a) 26 April 2021; (b) 24 October 2021.

(MG12) Zhemgang district, Tamala, standing water and mountain brooks, (27.085926°N, 90.642640°E, altitude 2,181 m), 25 April 2021.

(MG13) Zhemgang district, Tamala passes, lake below Tamala check post, thick tree canopies, and permanent standing water, (27.081386°N, 90.643579°E, altitude 1,397 m), 25 April 2021.

(MG14) Trongsa district, Nabji Korphu, fast flowing montane streams along the thick forest canopy, (27.190785°N, 90.526465°E, altitude 1,223 m), 16 May 2021.

(MG15) Trongsa district, Nabji Korphu, thick vegetation along forest streams, (27.195754°N,

90.515107°E, altitude 1,416 m), 19 May 2021.

(MG16) Trongsa district, Nabji Korphu, wetland with thick vegetation, (27.189306°N, 90.529591°E, altitude 1,187 m), 16 May 2021.

(MG17) Trongsa district, Nabji Korphu, streams with thick riparian vegetation and tree canopies, (27.184594°N, 90.521300°E, altitude 1,218 m), 16 May 2021.

(MG18) Trongsa district, Langthel, forest along the streams, (27.360582°N, 90.590122°E, altitude 1,571 m), (a) 16 May 2021; (b) 22 October 2021.

(MG19) Trongsa district, Langthel, stream with thick vegetation and tree canopies, (27.349298°N, 90.581241°E, altitude 1,140 m), (a) 16 May 2021; (b) 22 October 2021.

(MG20) Trongsa district, Langthel, above Bayzam bridge, grasslands and bushes by the wetland, (27.320119°N, 90.583442°E, altitude 1,082 m), (a) 14 April 2020; (b) 23 October 2021.

(MG21) Trongsa district, Langthel, wetland, water

channels, and paddy fields, (27.343525°N, 90.578323°E, altitude 1,002 m), (a) 20 April 2021; (b) 22 October 2021.

(MG22) Trongsa district, Langthel, streams along the forest, (27.348525°N, 90.582566°E, altitude 1,251 m), (a) 10 May 2021; (b) 22 October 2021.

(MG23) Trongsa district, Langthel, fast flowing streams with tree canopies, (27.334342°N, 90.596369°E, altitude 1,151 m), 10 May 2021.

(MG24) Trongsa district, Chendebji, wetland and brooks, (27.489954°N, 90.319323°E, altitude 2,712 m), (a) 14 May 2021; (b) 18 October 2021.

(MG25) Trongsa district, Nika Chhu stream with thick undisturbed riparian vegetation (27.44833°N, 90.37397°E, altitude 2,251 m), 01 December 2021.

(MG26) Samdrupjongkhar district, Jomotshangkha, stagnant pool side in Jangsa area with low land vegetation, (26.884801°N, 92.096801°E, altitude 280 m), 26 September 2020.

(MG27) Trongsa district, Kartigang Chhu, stream with thick vegetation and tall canopies away from settlements, on the way to Langthel from Tingtibi, (27.278597°N, 90.629933°E, altitude 1,355 m), 22 October 2021.

Other observations

(MG28) Zhemgang district, Buli, wetland by the forest, (27.206561°N, 90.711347°E, altitude 1,510 m), 30 November 2021, leg. Sherub D. Jamtsho.

(MG29) Zhemgang district, Kikhar, stream with thick fern growth, (27.171210°N 90.698348°E, altitude 698 m) 25 September 2019, leg. Reta Bdr.

(MG30) Zhemgang district, tandem flight capture over the grassland, (27.053908°N 90.847121°E, altitude 1,459 m), 23 March 2020, leg. Sherub D. Jamtsho.

(MG31) Zhemgang district, Nimshong Shingkhar, vegetation by the forest side, (27.246188°N 90.947851°E, altitude 1,252 m), (a) 14 May 2020; (b) 18 July 2020; (c) 25 August 2020, leg. Sherub D. Jamtsho.

(MG32) Zhemgang district, Therang, Shingkhar, perching by the forest, (27.278504°N 90.945818°E, altitude 1,911 m), (a) 30 May 2019; (b) 01 June 2019, leg. Sherub D. Jamtsho

(MG33) Zhemgang, Nimshong Shingkhar, thick vegetation near a steam, (27.191413°N 90.966913°E, altitude 1,464 m), (a) 26 July 2020; (b) 18 August 2019, leg. Sherub D. Jamtsho.

(MG34) Zhemgang, Nimshong Shingkhar, perching by the forest side, (27.225310°N 90.955527°E, altitude 1,544 m), 21 July 2018, leg. Sherub D. Jamtsho.

(MG35) Zhemgang district, Radhi Shingkhar, by the forest side, (27.271882°N 90.944047°E, altitude 1,881 m), 21 June 2019, leg. Sherub D. Jamtsho.

(MG36) Trongsa district, Jigme Singye Wangchuck

National Park, bamboo dominated forest (27.194522°N 90.479680°E, altitude 1,525 m), 18 November 2020, leg. Kado Rinchen.

(MG37) Trongsa district, Langthel, woodland by the standing water habitat, (27.326706°N, 90.583657°E, altitude 1,069 m), 11 July 2019, leg. Kado Rinchen.

RESULTS

Our survey resulted in 43 new species records of from Trongsa and Zhemgang, Central Bhutan. In addition, 17 other species were recorded from these dzongkhags (provinces) in previous publications bringing the total to 60 species belonging to 16 genera and 11 families (Table 1). Two of the species recorded by us, *Watanabeopetalia atkinsoni* and *Tetrathemis platyptera*, are new to Bhutan bringing the total number of species known from the country to 125.

All 37 localities from which we present records are in Trongsa and Zhemgang districts with the exception of locality 26 which is in Samdrupjongkhar district. This is however included here in order to include a second record of *T. platyptera*.

List of species recorded

Anisoptera (dragonfly)

Family Aeshnidae

1. *Aeshna petalura* (Martin, 1908), MG27, MG35, MG36.
2. *Cephalaeschna* sp. Selys, 1883, MG27.
3. *Gynacantha* sp. Rambur, 1842, MG27.
4. *Polycanthagyna erythromelas* (McLachlan, 1896), MG37.

Family Chlorogomphidae

5. *Watanabeopetalia atkinsoni** (Selys, 1878), MG15.

Family Cordulegasteridae

6. *Anotogaster nipalensis* (Selys, 1854), MG30.

Family Gomphidae

7. *Davidius* sp. Selys 1878, MG30.
8. *Lamelligomphus risi* (Fraser, 1922), MG1, MG2b, MG3, MG5b, MG6b.
9. *Perissogomphus stevensi* Laidlaw, 1922, MG2a, MG5b (3 larvae), MG6b (3 larvae), MG15, MG16, MG17.
10. *Scalmogomphus bistrigatus* Hagen, 1854. MG31c.

Family Libellulidae

11. *Crocothemis* sp. Brauer, 1868, MG1, MG2x, MG6x, MG7, MG25, MG32x.
12. *Diplacodes trivialis* (Rambur, 1842), MG2x, MG4x, MG10x, MG20a, MG24x.
13. *Orthetrum glaucum* (Brauer, 1865), MG2x, MG3, MG4x, MG11b, MG18x, MG22x.
14. *Orthetrum internum* MacLachlan, 1894, MG15, MG19a, MG20b, MG21x.
15. *Orthetrum luzonicum* (Brauer, 1868), MG2x, MG3, MG4x, MG10x.
16. *Orthetrum pruinosum* (Burmeister, 1839), MG1, MG2x, MG11a, MG12, MG23.
17. *Orthetrum sabina* (Drury, 1773), MG1, MG2x, MG11x, MG12, MG22a.
18. *Orthetrum triangulare* (Selys, 1878), MG1, MG3, MG4x, MG9, MG18b, MG23.
19. *Palpopleura sexmaculata* (Fabricius, 1787), MG1, MG2, MG6x, MG18x, MG22b.
20. *Pantala flavescens* (Fabricius, 1798), MG2x, MG3, MG14, MG16, MG19x.
21. *Sympetrum commixtum* (Selys, 1884), MG20x, MG24a, MG30.
22. *Tetrathemis platyptera** (Selys, 1878), MG1, MG26.
23. *Trithemis aurora* (Burmeister, 1839), MG2b, MG3, MG5a, MG9, MG19b.
24. *Trithemis festiva* (Rambur, 1842), MG2x, MG5x, MG7, MG8x, MG10a, MG21b.
25. *Trithemis pallidinervis* (Kirby, 1889), MG1, MG2.

Family Macromidae

26. *Macromia moorei* Selys, 1874, MG2x, MG3, MG5x, MG7, MG8x, MG14, MG15.

Zygoptera (damselfly)**Family Calopterygidae**

27. *Caliphaea confusa* Hagen in Selys, 1859, MG3, MG15, MG17, MG32a.
28. *Neurobasis chinensis* (Linnaeus, 1758), MG1, MG4x, MG5b (2 larvae), MG15, MG17.

Family Chlorocyphidae

29. *Aristocypha cuneata* (Selys, 1853), MG1, MG2b, MG4b, MG5b, MG7, MG9, MG10b.

Family Coenagrionidae

30. *Aciagrion olympicum* Laidlaw, 1919, MG31a.
31. *Agriocnemis pygmaea* Rambur, 1842, MG8b.
32. *Ceriagrion fallax* Ris, 1914, MG4, MG10b, MG11x.

33. *Ischnura rubilio* (Selys, 1876), MG2b, MG3, MG6b, MG8b, MG32b.

34. *Pseudagrion rubriceps* (Selys, 1876), MG6a, MG8a.

Family Euphaeidae

35. *Anisopleura comes* Hagen, 1880, MG14, MG15, MG16, MG17, MG33a & b.
36. *Anisopleura subplatystyla* Fraser, 1927, MG28, MG29, MG33b.
37. *Bayadera indica* Selys, 1853, MG23.

Family Lestidae

38. *Indolestes cyaneus* (Selys, 1862), MG12, MG13, MG24b, MG25.
39. *Lestes dorothea* Fraser, 1924, MG34.

Family Platystictidae

40. *Protosticta* sp. Selys, 1885, MG31b.

Family Platycnemididae

41. *Calicnemia eximia* Selys, 1863, MG13, MG15, MG18a, MG21a & b.
42. *Calicnemia miniata* (Selys, 1886), MG35.
43. *Copera vitatta* (Laidlaw, 1914) MG1, MG5x.

New records for Bhutan

Chlorogomphidae: *Watanabeopetalia atkinsoni* Selys, 1878 (Image 1A–E)

Specimens examined. Two males were collected from Nabji Korphu, locality MG15, (27.195754°N, 90.515107°E, altitude 1,416 m), Trongsa district, 19 May 2021, leg. Mer Man Gurung.

The members of the family Chlorogomphidae resembles those of Cordulegastridae in being large black and yellow dragonflies. The easiest character in the hand to distinguish members Chlorogomphidae from those of Cordulegastridae is the presence of one (*Chloropetalia*, *Watanabeopetalia*) or more (*Chlorogomphus*) cross veins in the median space or both fore and hindwing (none in members of Cordulegastridae). *Watanabeopetalia* can be distinguished from other species of Chlorogomphidae occurring in the eastern Himalayan region by the presence of two broad yellow stripes, one on mesepimeron and one on metepimeron, on the side of the thorax and by the front of face being light brown without well-defined yellow markings. Four *Watanabeopetalia* species have been described: *W. atkinsoni* (Selys, 1878), *W. ojisan* (Karube, 2013), *W. uenoi* (Asahina, 1995) and *W. usignata* (Chao, 1999) (Paulson et al. 2021). From these four species only *W.*

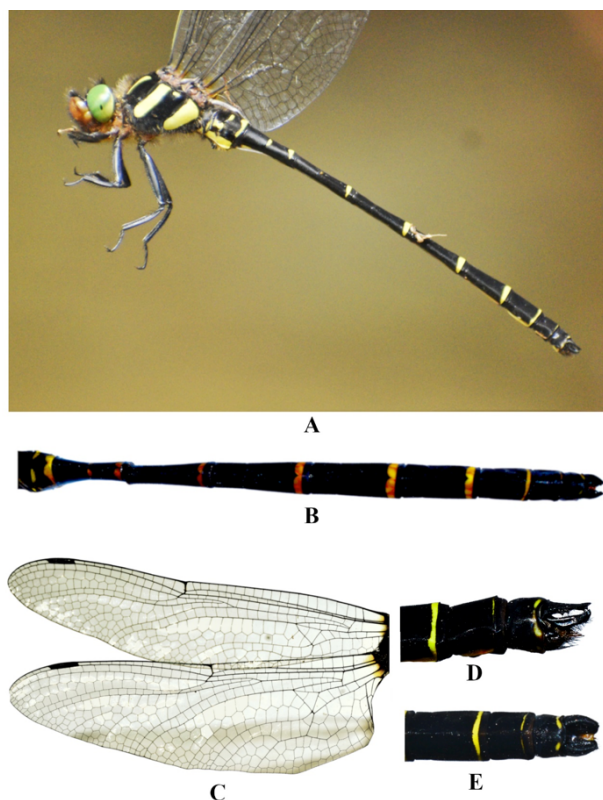


Image 1. Features of *Watanabeopetalia atkinsoni* (Selys, 1878), two males: A—Habitus, lateral view | B—Abdomen, dorsal view | C—Wings | D—Anal appendages, lateral | E—Anal appendages, dorsal leg. © Mer Man Gurung.

atkinsoni is known to occur in the Indian sub-continent where it has been found in India (west Bengal & Sikkim) and Nepal (Darjeeling & Shiva Puri, north Kathmandu valley) (Karen Conniff pers. comm. 01.x.2021).

The characters and body coloration of the two male specimens of Bhutanese *Watanabeopetalia atkinsoni* match well with the original description (Karube 2002). As this species is poorly known we provide additional figures of the species in life and details of the abdomen, wings and appendages (Image 1). Karube (2002) mentions that abdomen S1–8 is black with yellow markings and that S9–10 is either completely black or black with narrow yellow rings (Image 1B). This is also true for the Bhutanese specimens as one of the specimens has S9–10 black without yellow rings and other has yellow markings in last two segments (Image 1D–E). Karube (2002) describes the thorax as dark-brown to black marked on front with a bright citron-yellow oblique antehumeral stripe and on the side with two broad yellow stripes with in between them a small yellow upper spot. One of the specimens collected from Bhutan also has second yellow spot between the oblique antehumeral stripes (Image 1A).

Watanabeopetalia atkinsoni specimens were collected from a fast-flowing mountain stream on a sunny day. The riparian vegetation consisted of dense grasses with a tall tree canopy and the streambed consisted mostly of cobbles and sand. The water flow was obstructed frequently by rocks forming pools, cascades, and falls at several sites over which males were observed patrolling. Females were not observed. Other species found in this habitat include *Anisopleura comes*, *Caliphaea confusa*, *Macromia moorei*, and *Perissogomphus stevensi*.

Libellulidae: *Tetrathemis platyptera* Selys, 1878 (Image 2A–C)

Specimens examined. Two males and two females were collected from locality MG1, Tingtibi, Dakpay Chhu (27.152121°N, 90.693088°E, altitude 555 m), Zhemgang district, 25 October 2021, leg. Mer Man Gurung; 1 m#, locality MG26, Jangsa, Jomotsangkha (26.8848°N, 92.0968°E, altitude 280 m), Samdrupjongkhar, 26 September 2020, leg. Ghana S. Bhandari.

This species is distributed throughout wet montane



Image 2. Feature of *Tetrathemis platyptera* (Selys, 1878), two males and two females: A—Habitus, lateral view, male from Zhemgang leg. © Mer Man Gurung | B—Habitus, lateral view, male from Samdrupjongkhar. © Ghana S. Bhandari.

Table 1. Checklist of dragonflies and damselflies of central Bhutan, Trongsa (Tro), Zhemgang (Zhe) and Jigme Singye Wangchuck National Park (JSWNP), References (Ref). Of these 43 species were recorded during the present study and 17 species are only known from previous publications.

Species	Tro	Zhe	JSWNP	Ref
Order Anisoptera				
Family Aeshnidae				
1. <i>Aeshna petalura</i> (Martin, 1908)		x	x	
2. <i>Anax nigrofasciatus</i> (Oguma, 1915)		x	x	3
3. <i>Cephalaeschna</i> sp. Selys, 1883	x		x	
4. <i>Gynacantha</i> sp. Rambur, 1842		x	x	
5. <i>Polycanthagyna erythromelas</i> (McLachlan, 1896)	x		x	
Family Corduliidae				
6. <i>Somatochlora daviesi</i> Lieftinck, 1977	x		x	3
Family Chlorogomphidae				
7. <i>Chlorogomphus mortoni</i> (Fraser, 1936)		x	x	4
8. <i>Watanabeopetalia atkinsoni</i> (Selys, 1878) *	x		x	
Family Cordulegasteridae				
9. <i>Anotogaster nipalensis</i> (Selys, 1854)				
Family Gomphidae				
10. <i>Anisogomphus</i> sp. (Selys, 1854)	x		x	3
11. <i>Davidius</i> sp. Selys, 1878		x	x	
12. <i>Davidius boronii</i> Lieftinck, 1977	x		x	1
13. <i>Lamelligomphus risi</i> (Fraser, 1922)		x	x	
14. <i>Perissogomphus stevensi</i> Laidlaw, 1922	x	x	x	
15. <i>Scalmogomphus bistrigatus</i> Hegen, 1854		x	x	
Family Libellulidae				
16. <i>Crocothemis</i> sp. Brauer, 1868	x		x	
17. <i>Diplacodes nebulosa</i> (Fabricius, 1793)		x		4
18. <i>Diplacodes trivialis</i> (Rambur, 1842)	x	x	x	
19. <i>Lyriothemis bivittata</i> (Rambur, 1824)		x	x	4
20. <i>Orthetrum glaucum</i> (Brauer, 1865)	x	x	x	
21. <i>Orthetrum internum</i> MacLachlan, 1894	x	x	x	
22. <i>Orthetrum luzonicum</i> (Brauer, 1868)	x	x	x	
23. <i>Orthetrum pruinosum</i> (Burmeister, 1839)	x	x	x	
24. <i>Orthetrum sabina</i> (Drury, 1773)	x	x	x	
25. <i>Orthetrum triangulare</i> (Selys, 1878)	x	x	x	
26. <i>Palpopleura sexmaculata</i> (Fabricius, 1787)	x	x	x	
27. <i>Pantala flavescens</i> (Fabricius, 1798)	x	x	x	
28. <i>Sympetrum commixtum</i> (Selys, 1884)	x		x	
29. <i>Sympetrum hypomelas</i> (Selys, 1884)	x	x	x	3
30. <i>Tetrathemis platyptera</i> (Selys, 1878) *		x	x	
31. <i>Tamea virginia</i> (Rambur, 1842)		x	x	5
32. <i>Trithemis aurora</i> (Burmeister, 1839)	x	x	x	
33. <i>Trithemis festiva</i> (Rambur, 1842)	x	x	x	
34. <i>Trithemis pallidinervis</i> (Kirby, 1889)		x	x	
Family Macromiidae				
35. <i>Macromia moorei</i> Selys, 1874	x	x	x	

Species	Tro	Zhe	JSWNP	Ref
Order Anisozygoptera				
Family Epiophlebiidae				
36. <i>Epiophlebia laidlawi</i> Tillyard, 1921	x		x	2
Order Zygoptera				
Family Calopterygidae				
37. <i>Caliphaea confusa</i> Hagen in Selys, 1859	x	x	x	
38. <i>Neurobasis chinensis</i> (Linnaeus, 1758)	x	x	x	
Family Chlorocyphidae				
39. <i>Aristocypha cuneata</i> (Selys, 1853)	x	x	x	
40. <i>Aristocypha quadrimaculata</i> (Selys, 1853)		x		4
41. <i>Libellago lineata</i> (Burmeister, 1839)		x		
42. <i>Paracypha unimaculata</i> Selys, 1853		x		4
Family Coenagrionidae				
43. <i>Aciagrion pallidum</i> Selys, 1891	x		x	3
44. <i>Aciagrion olympicum</i> Laidlawi, 1919	x		x	3
45. <i>Agriocnemis pygmaea</i> Rambur, 1842		x	x	
46. <i>Ceriagrion fallax</i> Ris, 1914		x	x	
47. <i>Ischnura rubilio</i> (Selys, 1876)	x	x	x	
48. <i>Pseudagrion rubriceps</i> (Selys, 1876)		x	x	
Family Euphaeidae				
49. <i>Anisopleura comes</i> Hagen, 1880	x		x	
50. <i>Anisopleura subplatystyla</i> (Fraser, 1927)	x		x	3
51. <i>Bayadera indica</i> Selys, 1853	x		x	
Family Synlestidae				
52. <i>Megalestes major</i> (Selys, 1862)	x		x	
53. <i>Megalestes gyalsey</i> (Gyeltshen, Kalkman & Orr, 2017)	x		x	5
Family Lestidae				
54. <i>Indolestes cyaneus</i> (Selys, 1862)	x	x	x	
55. <i>Lestes dorothea</i> Fraser, 1924				
Family Platystictidae				
56. <i>Protosticta</i> sp. Selys, 1885				
Family Platynemididae				
57. <i>Calicnemia eximia</i> Selys, 1863	x	x	x	
58. <i>Calicnemia miniata</i> (Selys, 1886)				
59. <i>Calicnemia mortoni</i> Laidlawi, 1917		x	x	6
60. <i>Copera vitatta</i> (Laidlaw, 1914)		x		

1—Lieftinck (1977) | 2—Dorji (2015) | 3—Kalkman & Gyeltshen (2016) | 4—Gyeltshen (2017) | 5—Gyeltshen et al. (2017) | 6—Gurung et al. (2021).

lowlands of tropical southern regions and southeastern Asia occurring as far south as Java. Males were encountered at MG1 patrolling over a small pool with thick riparian vegetation. The bottom consisted mostly of debris with the water being just 50 cm deep. Only few females were spotted ovipositing on the twigs above the

pond, but males were quite abundant. *Copera vitatta* (Laidlaw, 1914), *Orthetrum triangulare* (Selys, 1878), *Orthetrum glaucum* (Brauer, 1865), *Trithemis festiva* (Rambur, 1842), and *Trithemis aoura* (Burmeister, 1839) were co-occupying the habitat.



Image 3. *Lamelligomphus risi* (Fraser, 1922), one male: Habitus, lateral view, male leg. © Mer Man Gurung.

DISCUSSION

With this study the number of species known from Bhutan becomes 125 but it is likely that with the present speed of discovery this number will steadily continue to increase. The Bhutanese odonate fauna is expected to contain at least 150 species. The occurrence of both species found new to Bhutan, *Watanabeopetalia atkinsoni* and *Tetrathemis platyptera*, is no surprise as they were known from adjacent areas. Where *T. platyptera* is mainly found in the lowland, however, *W. atkinsoni* is confined to mountains occurring from Nepal to the north of Thailand. *W. atkinsoni* has not been recorded from Burma but undoubtedly occurs there as well. Although the knowledge on the fauna of northeast of the Indian peninsula is clearly increasing there are still many genera which are poorly known and in need of further study and/or revision. These include several genera also found in central Bhutan, such as *Cephalaeschna*, *Davidius*, *Gynacantha*, and *Anisogomphus*. In many cases more material is needed and comparison with types and/or material from southeastern Asia or China is needed. An increase in number of DNA barcodes available from different regions would make it easier to test if species might be identical or are clearly different.

With 60 species the central part of Bhutan is moderately well explored and more field work is likely to show that the area holds at least 100 species. Especially the lowland areas of Royal Manas National Park (RMNP) are likely to hold many Oriental species not known from Trongsa and Zhemgang districts or even completely new to Bhutan.

REFERENCES

- Abbott, J. C. (2021). The Value of Odonate Collections, pp. 41–45. In: Abbott, J.C. (ed.). *Damselflies of Texas*. University of Texas Press, 292 pp.
- Conniff, K. & A. Sasamoto (2019). Revision of the status of *Anaciaeschna donaldi* and *A. martini*, with allied species, and distributional notes (Odonata: Aeshnidae). *Odonatologica* 48 (3–4): 265–284. <https://doi.org/10.5281/zenodo.3539740>
- Cuong, D.M., B.H. Manh & N.V. Khoi (2011). Dragonflies of Phu Quoc Island, South Vietnam. *AGRION* 15 (2): 54–57pp.
- Dorji, T. (2015). New distribution records of *Epiophlebia laidlawi* Tillyard, 1921 (Insecta: Odonata) in Bhutan. *Journal of Threatened Taxa* 7(10): 7668–7675. <https://doi.org/10.11609/JoTT.o4092.7668-75>
- Fraser, F.C. (1933). *The Fauna of British-India including Ceylon and Burma, Odonata. Vol. I.* Taylor & Francis Ltd., London, 436 pp.
- Fraser, F.C. (1934). *The Fauna of British India including Ceylon and Burma: Odonata: Vol. II.* Taylor & Francis Ltd., London, 442 pp.
- Fraser, F.C. (1936). *The Fauna of British India including Ceylon and Burma: Odonata: Vol. III.* Taylor & Francis Ltd., London, 482 pp.
- Gurung, M.M., V. Kalkman, G.S. Bhandari & A. Dhimal (2021). Nine new species of dragonfly and damselfly for Bhutan (Insect: Odonata) with a note on *Calicnemia mortoni*. *Agrion* 49(22): 22–28. <https://doi.org/10.1007/s12210-020-00942-6>
- Gyeltshen, T. (2017). A survey of Odonata from eastern Bhutan, with nine new national records. *Notulae odonatologicae* 8(9): 354–364pp.
- Gyeltshen, T., V. Kalkman, & A. Orr (2017). *A Field Guide to the Common Dragonflies & Damselflies of Bhutan*. National Biodiversity Centre (NBC), 1–75 pp.
- Gyeltshen, T., V.J. Kalkman & A.G. Orr (2017). Honoring His Royal Highness, the Crown Prince of Bhutan: *Megalestes gyalsey* (Odonata: Synlestidae). *Zootaxa* 4224(4): 588–594. <https://doi.org/10.11646/zootaxa.4244.4.9>
- Gyeltshen, T., T. Nidup, P. Dorji, T. Dorji & V.J. Kalkman (2017). Bibliography and checklist of the dragonflies and damselflies of Bhutan. *Journal of threatened Taxa* 9(1): 9743–9747. <https://doi.org/10.11609/jott.2758.9.1.9743-9747>
- Gyeltshen, T., V.J. Kalkman & A.G. Orr (2017). *A field guide to the common dragonflies & damselflies of Bhutan*. National Biodiversity Centre, Bhutan, 75 pp.
- Kalkman, V.J. & T. Gyeltshen (2016). Records of dragonflies from western Bhutan collected in October 2015. *International Dragonfly Fund Report*: 94, 1a.
- Kalkman, V.J., R. Babu, M. Bedjanic, K. Conniff, T. Gyeltshen, M.K. Khan & A.G. Orr (2020). Checklist of the dragonflies and damselflies (Insecta: Odonata) of Bangladesh, Bhutan, India, Nepal, Pakistan and Sri Lanka. *Zootaxa* 4849(1): 1–84. <https://doi.org/10.11646/zootaxa.4849.1.1>
- Karube, H. (2002). *Watanabeopetalia* gen. nov., a new genus of the dragonflies (Odonata, Cordulegastridae, Chlorogomphinae). *Special Bulletin of the Japanese Society of Coleopterology*, Tokyo 5: 67–85.
- Lham, D. (2019). Environmental Sustainability: The Case of Bhutan, pp. 113–140. In: *Sustainability and the Rights of Nature in Practice*. CRC Press.
- Lieftinck, M.A. (1977). Ergebnisse der Bhutan-Expedition 1972 des naturhistorischen Museums in Basel: Odonata. *Entomologica Brasiliensia* 2: 11–37.
- Paulson, D., M. Schorr & C. Deliry (2021). World Odonata List, Slater Museum of Natural History, University of Puget Sound. <https://www2.pugetsound.edu/files/resources/world-odonata-list-20210908.xls/> Accessed 12 September 2021.
- Rasaily, B., V.J. Kalkman, O. Katel & B. Suberi (2021). The distribution, phenology and altitudinal range of dragonflies and damselflies in Bhutan. *International Dragonfly Fund Report* 160: 21–74.

Dr. George Mathew, Kerala Forest Research Institute, Peechi, India
 Dr. John Noyes, Natural History Museum, London, UK
 Dr. Albert G. Orr, Griffith University, Nathan, Australia
 Dr. Sameer Padhye, Katholieke Universiteit Leuven, Belgium
 Dr. Nancy van der Poorten, Toronto, Canada
 Dr. Kareen Schnabel, NIWA, Wellington, New Zealand
 Dr. R.M. Sharma, (Retd.) Scientist, Zoological Survey of India, Pune, India
 Dr. Manju Siliwal, WILD, Coimbatore, Tamil Nadu, India
 Dr. G.P. Sinha, Botanical Survey of India, Allahabad, India
 Dr. K.A. Subramanian, Zoological Survey of India, New Alipore, Kolkata, India
 Dr. P.M. Sureshan, Zoological Survey of India, Kozhikode, Kerala, India
 Dr. R. Varatharajan, Manipur University, Imphal, Manipur, India
 Dr. Eduard Vives, Museu de Ciències Naturals de Barcelona, Terrassa, Spain
 Dr. James Young, Hong Kong Lepidopterists' Society, Hong Kong
 Dr. R. Sundararaj, Institute of Wood Science & Technology, Bengaluru, India
 Dr. M. Nithyanandan, Environmental Department, La Ala Al Kuwait Real Estate. Co. K.S.C., Kuwait
 Dr. Himender Bharti, Punjabi University, Punjab, India
 Mr. Purnendu Roy, London, UK
 Dr. Saito Motoki, The Butterfly Society of Japan, Tokyo, Japan
 Dr. Sanjay Sondhi, TITLI TRUST, Kalpavriksh, Dehradun, India
 Dr. Nguyen Thi Phuong Lien, Vietnam Academy of Science and Technology, Hanoi, Vietnam
 Dr. Nitin Kulkarni, Tropical Research Institute, Jabalpur, India
 Dr. Robin Wen Jiang Ngiam, National Parks Board, Singapore
 Dr. Lionel Monod, Natural History Museum of Geneva, Genève, Switzerland.
 Dr. Asheesh Shivam, Nehru Gram Bharti University, Allahabad, India
 Dr. Rosana Moreira da Rocha, Universidade Federal do Paraná, Curitiba, Brasil
 Dr. Kurt R. Arnold, North Dakota State University, Saxony, Germany
 Dr. James M. Carpenter, American Museum of Natural History, New York, USA
 Dr. David M. Claborn, Missouri State University, Springfield, USA
 Dr. Kareen Schnabel, Marine Biologist, Wellington, New Zealand
 Dr. Amazonas Chagas Júnior, Universidade Federal de Mato Grosso, Cuiabá, Brasil
 Mr. Monsoon Jyoti Gogoi, Assam University, Silchar, Assam, India
 Dr. Heo Chong Chin, Universiti Teknologi MARA (UiTM), Selangor, Malaysia
 Dr. R.J. Shiel, University of Adelaide, SA 5005, Australia
 Dr. Siddharth Kulkarni, The George Washington University, Washington, USA
 Dr. Priyadarsanan Dharma Rajan, ATREE, Bengaluru, India
 Dr. Phil Alderslade, CSIRO Marine And Atmospheric Research, Hobart, Australia
 Dr. John E.N. Veron, Coral Reef Research, Townsville, Australia
 Dr. Daniel Whitmore, State Museum of Natural History Stuttgart, Rosenstein, Germany.
 Dr. Yu-Feng Hsu, National Taiwan Normal University, Taipei City, Taiwan
 Dr. Keith V. Wolfe, Antioch, California, USA
 Dr. Siddharth Kulkarni, The Hormiga Lab, The George Washington University, Washington, D.C., USA
 Dr. Tomas Ditrich, Faculty of Education, University of South Bohemia in Ceske Budejovice, Czech Republic
 Dr. Mihaly Foldvari, Natural History Museum, University of Oslo, Norway
 Dr. V.P. Uniyal, Wildlife Institute of India, Dehradun, Uttarakhand 248001, India
 Dr. John T.D. Caleb, Zoological Survey of India, Kolkata, West Bengal, India
 Dr. Priyadarsanan Dharma Rajan, Ashoka Trust for Research in Ecology and the Environment (ATREE), Royal Enclave, Bangalore, Karnataka, India

Fishes

Dr. Neelesh Dahanukar, IISER, Pune, Maharashtra, India
 Dr. Topiltzin Contreras MacBeath, Universidad Autónoma del estado de Morelos, México
 Dr. Heok Hee Ng, National University of Singapore, Science Drive, Singapore
 Dr. Rajeev Raghavan, St. Albert's College, Kochi, Kerala, India
 Dr. Robert D. Sluka, Chiltern Gateway Project, A Rocha UK, Southall, Middlesex, UK
 Dr. E. Vivekanandan, Central Marine Fisheries Research Institute, Chennai, India
 Dr. Davor Zanella, University of Zagreb, Zagreb, Croatia
 Dr. A. Biju Kumar, University of Kerala, Thiruvananthapuram, Kerala, India
 Dr. Akhilesh K.V., ICAR-Central Marine Fisheries Research Institute, Mumbai Research Centre, Mumbai, Maharashtra, India
 Dr. J.A. Johnson, Wildlife Institute of India, Dehradun, Uttarakhand, India
 Dr. R. Ravinesh, Gujarat Institute of Desert Ecology, Gujarat, India

Amphibians

Dr. Sushil K. Dutta, Indian Institute of Science, Bengaluru, Karnataka, India
 Dr. Annemarie Ohler, Muséum national d'Histoire naturelle, Paris, France

Reptiles

Dr. Gernot Vogel, Heidelberg, Germany
 Dr. Raju Vyas, Vadodara, Gujarat, India
 Dr. Pritpal S. Soorae, Environment Agency, Abu Dhabi, UAE.
 Prof. Dr. Wayne J. Fuller, Near East University, Mersin, Turkey
 Prof. Chandrashekhar U. Rivonker, Goa University, Taleigao Plateau, Goa, India
 Dr. S.R. Ganesh, Chennai Snake Park, Chennai, Tamil Nadu, India
 Dr. Himansu Sekhar Das, Terrestrial & Marine Biodiversity, Abu Dhabi, UAE

Birds

Dr. Hem Sagar Baral, Charles Sturt University, NSW Australia
 Mr. H. Byju, Coimbatore, Tamil Nadu, India
 Dr. Chris Bowden, Royal Society for the Protection of Birds, Sandy, UK
 Dr. Priya Davidar, Pondicherry University, Kalapet, Puducherry, India
 Dr. J.W. Duckworth, IUCN SSC, Bath, UK
 Dr. Rajah Jayapal, SAGON, Coimbatore, Tamil Nadu, India
 Dr. Rajiv S. Kalsi, M.L.N. College, Yamuna Nagar, Haryana, India
 Dr. V. Santharam, Rishi Valley Education Centre, Chittoor Dt., Andhra Pradesh, India
 Dr. S. Balachandran, Bombay Natural History Society, Mumbai, India
 Mr. J. Praveen, Bengaluru, India
 Dr. C. Srinivasulu, Osmania University, Hyderabad, India
 Dr. K.S. Gopi Sundar, International Crane Foundation, Baraboo, USA
 Dr. Gombobaatar Sunde, Professor of Ornithology, Ulaanbaatar, Mongolia
 Prof. Reuven Yosef, International Birding & Research Centre, Eilat, Israel
 Dr. Taej Mundkur, Wetlands International, Wageningen, The Netherlands
 Dr. Carol Inskipp, Bishop Auckland Co., Durham, UK
 Dr. Tim Inskipp, Bishop Auckland Co., Durham, UK
 Dr. V. Gokula, National College, Tiruchirappalli, Tamil Nadu, India
 Dr. Arkady Lelej, Russian Academy of Sciences, Vladivostok, Russia
 Dr. Simon Dowell, Science Director, Chester Zoo, UK
 Dr. Mário Gabriel Santiago dos Santos, Universidade de Trás-os-Montes e Alto Douro, Quinta de Prados, Vila Real, Portugal
 Dr. Grant Connette, Smithsonian Institution, Royal, VA, USA
 Dr. M. Zafar-ul Islam, Prince Saud Al Faisal Wildlife Research Center, Taif, Saudi Arabia

Mammals

Dr. Giovanni Amori, CNR - Institute of Ecosystem Studies, Rome, Italy
 Dr. Anwaruddin Chowdhury, Guwahati, India
 Dr. David Mallon, Zoological Society of London, UK
 Dr. Shomita Mukherjee, SAGON, Coimbatore, Tamil Nadu, India
 Dr. Angie Appel, Wild Cat Network, Germany
 Dr. P.O. Nameer, Kerala Agricultural University, Thrissur, Kerala, India
 Dr. Ian Redmond, UNEP Convention on Migratory Species, Lansdown, UK
 Dr. Heidi S. Riddle, Riddle's Elephant and Wildlife Sanctuary, Arkansas, USA
 Dr. Karin Schwartz, George Mason University, Fairfax, Virginia.
 Dr. Lala A.K. Singh, Bhubaneswar, Orissa, India
 Dr. Mewa Singh, Mysore University, Mysore, India
 Dr. Paul Racey, University of Exeter, Devon, UK
 Dr. Honnavalli N. Kumara, SAGON, Anaikatty P.O., Coimbatore, Tamil Nadu, India
 Dr. Nishith Dharaiya, HNG University, Patan, Gujarat, India
 Dr. Spartaco Gippoliti, Socio Onorario Società Italiana per la Storia della Fauna "Giuseppe Altobello", Rome, Italy
 Dr. Justus Joshua, Green Future Foundation, Tiruchirappalli, Tamil Nadu, India
 Dr. H. Raghuram, The American College, Madurai, Tamil Nadu, India
 Dr. Paul Bates, Harison Institute, Kent, UK
 Dr. Jim Sanderson, Small Wild Cat Conservation Foundation, Hartford, USA
 Dr. Dan Challender, University of Kent, Canterbury, UK
 Dr. David Mallon, Manchester Metropolitan University, Derbyshire, UK
 Dr. Brian L. Cypher, California State University-Stanislaus, Bakersfield, CA
 Dr. S.S. Talmale, Zoological Survey of India, Pune, Maharashtra, India
 Prof. Karan Bahadur Shah, Budhanilakantha Municipality, Kathmandu, Nepal
 Dr. Susan Cheyne, Borneo Nature Foundation International, Palangkaraja, Indonesia
 Dr. Hemanta Kafley, Wildlife Sciences, Tarleton State University, Texas, USA

Other Disciplines

Dr. Aniruddha Belsare, Columbia MO 65203, USA (Veterinary)
 Dr. Mandar S. Paingankar, University of Pune, Pune, Maharashtra, India (Molecular)
 Dr. Jack Tordoff, Critical Ecosystem Partnership Fund, Arlington, USA (Communities)
 Dr. Ulrike Streicher, University of Oregon, Eugene, USA (Veterinary)
 Dr. Hari Balasubramanian, EcoAdvisors, Nova Scotia, Canada (Communities)
 Dr. Rayanna Hellem Santos Bezerra, Universidade Federal de Sergipe, São Cristóvão, Brazil
 Dr. Jamie R. Wood, Landcare Research, Canterbury, New Zealand
 Dr. Wendy Collinson-Jonker, Endangered Wildlife Trust, Gauteng, South Africa
 Dr. Rajeshkumar G. Jani, Anand Agricultural University, Anand, Gujarat, India
 Dr. O.N. Tiwari, Senior Scientist, ICAR-Indian Agricultural Research Institute (IARI), New Delhi, India
 Dr. L.D. Singla, Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana, India
 Dr. Rupika S. Rajakaruna, University of Peradeniya, Peradeniya, Sri Lanka
 Dr. Bahar Baviskar, Wild-CER, Nagpur, Maharashtra 440013, India

Reviewers 2019–2021

Due to pausity of space, the list of reviewers for 2018–2020 is available online.

The opinions expressed by the authors do not reflect the views of the Journal of Threatened Taxa, Wildlife Information Liaison Development Society, Zoo Outreach Organization, or any of the partners. The journal, the publisher, the host, and the partners are not responsible for the accuracy of the political boundaries shown in the maps by the authors.

Journal of Threatened Taxa is indexed/abstracted in Bibliography of Systematic Mycology, Biological Abstracts, BIOSIS Previews, CAB Abstracts, EBSCO, Google Scholar, Index Copernicus, Index Fungorum, JournalSeek, National Academy of Agricultural Sciences, NewJour, OCLC WorldCat, SCOPUS, Stanford University Libraries, Virtual Library of Biology, Zoological Records.

NAAS rating (India) 5.64

Print copies of the Journal are available at cost. Write to:
 The Managing Editor, JoTT,
 c/o Wildlife Information Liaison Development Society,
 No. 12, Thiruvannamalai Nagar, Saravanampatti - Kalapatti Road,
 Saravanampatti, Coimbatore, Tamil Nadu 641035, India
 ravi@threatenedtaxa.org



www.threatenedtaxa.org

OPEN ACCESS



The Journal of Threatened Taxa (JoTT) is dedicated to building evidence for conservation globally by publishing peer-reviewed articles online every month at a reasonably rapid rate at www.threatenedtaxa.org. All articles published in JoTT are registered under [Creative Commons Attribution 4.0 International License](https://creativecommons.org/licenses/by/4.0/) unless otherwise mentioned. JoTT allows unrestricted use, reproduction, and distribution of articles in any medium by providing adequate credit to the author(s) and the source of publication.

ISSN 0974-7907 (Online) | ISSN 0974-7893 (Print)

September 2022 | Vol. 14 | No. 9 | Pages: 21751–21902

Date of Publication: 26 September 2022 (Online & Print)

DOI: 10.11609/jott.2022.14.9.21751-21902

Article

Diversity, distribution, and abundance status of small mammalian fauna (Chiroptera: Rodentia: Eulipotyphla) of Manipur, India

– Uttam Saikia & A.B. Meetei, Pp. 21751–21768

Review

Conservation of Tiger *Panthera tigris* in Nepal: a review of current efforts and challenges

– Pramod Ghimire, Pp. 21769–21775

Communications

Effects of visitor disturbance on tetrapod vertebrates in the Horton Plains National Park, Sri Lanka

– D.M.T. Dhananjani & W.A.D. Mahaulpatha, Pp. 21776–21785

Population density and nesting behaviour of Indian Giant Squirrel *Ratufa indica* (Erxleben, 1777) in Bhimashankar Wildlife Sanctuary, Western Ghats of Maharashtra, India

– Ganesh Rathod, Erach Bharucha & Kranti Yardi, Pp. 21786–21796

First camera-trap confirmation of Tibetan Brown Bear *Ursus arctos pruinosus* Blyth, 1854 (Mammalia: Carnivora: Ursidae) with a review of its distribution and status in Nepal

– Madhu Chetri, Pp. 21797–21804

Age estimation of Tiger *Panthera tigris* (Linnaeus, 1758) and Lion *Panthera leo* (Linnaeus, 1758) (Mammalia: Carnivora: Felidae): applicability of cementum annuli analysis method

– Vipin, Chandra Prakash Sharma, Vinita Sharma, Surendra Prakash Goyal, Heather Stevens & Sandeep Kumar Gupta, Pp. 21805–21810

Hematological value of captive Asian Elephants *Elephas maximus* around Chitwan National Park, Sauraha, Nepal

– Roshan Ghimire, Sagar Regmi, Rakshya Shrestha, Amir Sadaula & Janardan Dev Joshi, Pp. 21811–21817

Foraging strata and dietary preferences of fifteen species of babblers in Sarawak, Malaysia

– Jayasilan Mohd-Azlan, Attiqah Fadzilah Sopian, Andrew Alek Tuen & Chong Leong Puan, Pp. 21818–21825

Effects of wind farm on land bird composition at Kachchh District, Gujarat, India

– Selvaraj Ramesh Kumar, P.R. Arun & A. Mohamed Samsoor Ali, Pp. 21826–21835

New records of odonates from Trongsa and Zhemgang, central Bhutan with a checklist of Jigme Singye Wangchuck National Park

– Mer Man Gurung, Cheten Dorji, Abir Man Sinchuri, Sanjit K. Rai, Karma C. Dendup & Vincent J. Kalkman, Pp. 21836–21844

Land snails of Guwahati, Assam, India

– Girindra Kalita, Pp. 21845–21852

Morphology characterization and phytochemical overview of the Moluccan Ironwood *Intsia bijuga* (Colebr.) Kuntze, a living collection of Purwodadi Botanic Garden, Indonesia

– Melisnawati H. Angio, Elga Renjana & Elok Rifqi Firdiana, Pp. 21853–21861

Woody plant wealth of Therikadu Reserve Forest, Tuticorin, India: a checklist

– V. Muneeswaran & M. Udayakumar, Pp. 21862–21869

Invasive alien plant species of Hassan District, Karnataka, India

– G.M. Prashanth Kumar & Shiddamallayya Nagayya, Pp. 21870–21890

Notes

First photographic evidence of the Binturong *Arctictis binturong* (Raffles, 1821) from Nepal

– Madhu Chetri, Purna Bahadur Ale, Tulasi Prasad Dahal & Karan Bahadur Shah, Pp. 21891–21894

First record of *Chlorophorus jucundus* (Perroud, 1855) (Coleoptera: Cerambycidae: Cerambycinae) from Maharashtra, India

– Yogesh K. Mane & Sunil M. Gaikwad, Pp. 21895–21897

First record of the swallowtail moth *Epiplema adamantina* Inoue, 1998 (Lepidoptera: Uraniidae: Epipleminae) from western Himalaya, India

– Lekhendra & Arun Pratap Singh, Pp. 21898–21899

Visceral tetrathyridiosis *Mesocestoides* sp. (Cestoda: Cyclophyllidae) in a wild Barn Owl *Tyto alba* - a first report and new host record

– P.G. Vimalraj & A. Latchumikanthan, Pp. 21900–21902

Publisher & Host

