

Building evidence for conservation globally

Journal of Threatened Taxa



10.11609/jott.2022.14.7.21331-21486

www.threatenedtaxa.org

26 July 2022 (Online & Print)

14(7): 21331-21486

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 Illustration, 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, Mavinhalla 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. Ilangovan, Chennai, India

Web Development

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

Typesetting

Mr. Arul Jagadish, ZOO, Coimbatore, India

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 Baños, Laguna, Philippines

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

Dr. Afroz Alam, Banasthali Vidyapeeth (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, Ilandudno, 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: A female Javan Leopard *Panthera pardus melas* in rehabilitation phase at Cikananga Wildlife Center. © Yayasan Cikananga Konservasi Terpadu.



First record of *Garra birostris* Nebeshwar & Vishwanath, 2013 (Cypriniformes: Cyprinidae) from Doyang and Dikhu rivers of Brahmaputra drainage, Nagaland, India

Sophiya Ezung¹ , Metevinu Kechu² & Pranay Punj Pankaj³

¹⁻³ Department of Zoology, Fish Biology and Fisheries Lab, Nagaland University, Lumami, Nagaland 798627, India.

¹sophiezung@gmail.com, ²metevinu06@gmail.com, ³pranaypunj@gmail.com (corresponding author)

Abstract: *Garra birostris* is recorded for the first time from the Doyang and Dikhu tributaries of the Brahmaputra drainage, Nagaland, northeastern India. The detailed morphometric and meristic data of the specimens that forms the basis of this new record are presented.

Keywords: Freshwater fish, meristic data, northeastern India, stone suckers, taxonomy.

Members of the labeonine genus *Garra* Hamilton, 1822 are widely distributed from Sub-Saharan Africa to Borneo through the Arabian Peninsula, southern, and southeastern Asia, and southern China (Zhang & Chen 2002). The genus *Garra* is diagnosed in possessing a specialized adhesive pad or modified lower lip forming a gular disc, that displays extraordinary variations in the snout (Kottelat 2020a). They can also be distinguished by their pharyngeal teeth arranged in three rows, the origin of dorsal fin which starts slightly anterior to pelvic fins, and an anal fin originating well behind the pelvic

fins (Stiassny & Getahun 2007).

Northeastern India, part of the Himalaya Biodiversity Hotspot is represented by 56 nominal species of the genus *Garra* which are distributed in the Brahmaputra, Barak, Kaladan, Karnaphuli, and Chindwin drainages, respectively (Vishwanath 2017; Roni & Vishwanath 2018; Fricke et al. 2022). Rivers in the state of Nagaland harbour 13 species of the genus *Garra*—*G. annandalei* Hora, 1921, *G. gravelyi* Annandale, 1919, *G. gotyla* Gray, 1830, *G. kempfi* Hora, 1921, *G. lamta* Hamilton, 1822, *G. lissorhynchus* McClelland, 1842, *G. maclellandi* Jerdon, 1849, *G. notata* Blyth, 1861, *G. naganensis* Hora, 1921, *G. nasuta* McClelland, 1838, *G. rupicola* McClelland, 1839, *G. chathensis* Ezung, Shangningam & Pankaj, 2020 and *G. langlungensis* Ezung, Shangningam & Pankaj, 2021 (Ezung et al. 2020a,b,c). So far, *Garra birostris* known to occur in Arunachal Pradesh (Nebeshwar & Vishwanath 2013) and Assam (Basumatary et al. 2017)

Editor: Rajeev Raghavan, Kerala University of Fisheries and Ocean Studies, Kochi, India.

Date of publication: 26 July 2022 (online & print)

Citation: Ezung, S., M. Kechu & P.P. Pankaj (2022). First record of *Garra birostris* Nebeshwar & Vishwanath, 2013 (Cypriniformes: Cyprinidae) from Doyang and Dikhu rivers of Brahmaputra drainage, Nagaland, India. *Journal of Threatened Taxa* 14(7): 21453–21457. <https://doi.org/10.11609/jott.7075.14.7.21453-21457>

Copyright: © Ezung et al. 2022. Creative Commons Attribution 4.0 International License. JoTT allows unrestricted use, reproduction, and distribution of this article in any medium by providing adequate credit to the author(s) and the source of publication.

Funding: (a) University Grants Commission, New Delhi; (b) Ministry of Tribal Affairs, Government of India; (c) ICAR-National Bureau of Fish Genetic Resources, Lucknow.

Competing interests: The authors declare no competing interests.

Acknowledgements: SE & MK are grateful to the University Grants Commission, New Delhi for financial assistance for the award of UGC Non-NET fellowship, Nagaland University and scholarship for higher studies of ST students under the Ministry of Tribal Affairs, Government of India respectively. PPP gratefully acknowledges the financial support from ICAR-National Bureau of Fish Genetic Resources, Lucknow. Authors are grateful to Kailash Chandra (ZSI) for permission to examine materials and to B. Shangningam for encouragement and consent to examined type specimens under her care. Authors are also grateful to L. Kosygin (ZSI) for providing information.



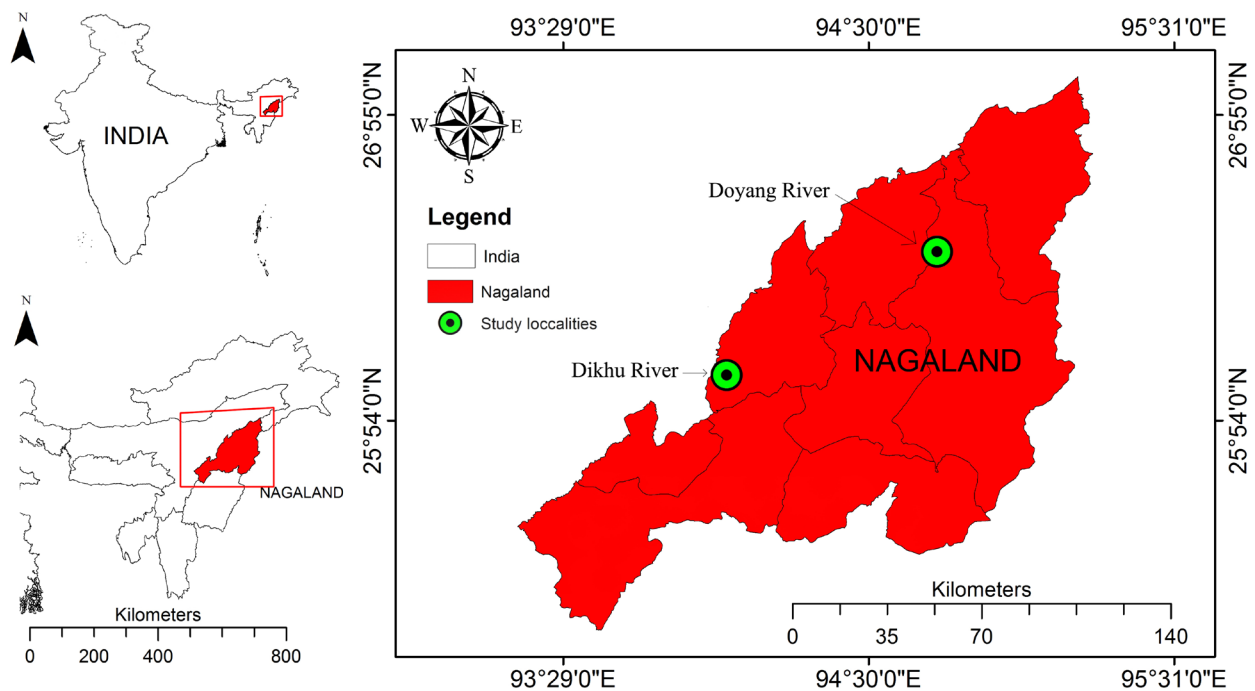


Figure 1. Collection locations of *Garra birostris* in the Doyang River and Dikhu River, Nagaland, India.

as well as in neighbouring Bhutan (Thoni et al. 2016). The present study records for the first time the occurrence of *Garra birostris* from two major river systems of Nagaland state—Dikhu and Doyang—are tributaries of the Brahmaputra.

MATERIALS AND METHODS

Specimens were collected from the Doyang (26.0605°N, 94.0005°E) and Dikhu rivers (26.4506°N, 94.7033°E) of the Brahmaputra drainage, in Nagaland, India (Figure 1). Specimens were fixed in 10% formalin on site, and subsequently transferred to 70% ethanol for permanent storage. All measurements were recorded to the nearest 0.1 mm using digital calipers including the first non-zero digit from the left, through the last digit. Meristic and morphometric data followed Kottelat (2000b) and Nebeshwar & Vishwanath (2013). Gular disc terminology followed Kottelat (2020a). Meristic data were taken under a Leica M205A stereo-zoom microscope. ArcGIS tool was used to map the spatial distribution of specimens (ESRI 2017). Specimens are deposited at the Zoological Survey of India (ZSI), Kolkata and Nagaland University Fish Museum (NUFM), Nagaland.

RESULTS

Specimens were identified as *Garra birostris* primarily based on the presence of a prominent, bilobed proboscis, bearing large, tri- to tetra-cuspid acanthoid

tubercles on each lobe, a transverse lobe with small to large acanthoid tubercles, deep transverse groove, a black spot at the upper angle of gill opening and six lateral black stripes on the caudal peduncle (Image 1,2). Meristic and morphometric data are presented in Table 1. Dorsal fins with two simple and, 8½ branched rays. Pectoral fin with one simple and, 12–15 branched rays. Pelvic fin with one simple and 8 branched rays. Anal fin with two simple and 5½ branched rays. Predorsal scales 10–11. Lateral line complete with 33–34 scales. Circumpeduncular scales rows 16. Transverse scale rows above lateral line scale 4½, and, between lateral line and pelvic-fin origin 3½.

Distribution and Habitat

Previously known only from the rivers in Arunachal Pradesh (Nebeshwar & Vishwanath 2013), Assam (Basumatary et al. 2017), and Bhutan (Thoni et al. 2016), this study extends the distribution of the species into the Doyang and Dikhu rivers of Nagaland. *Garra birostris* tends to inhabit swiftly-flowing sections of headwaters and tributaries of large river systems, but also occurs in some wider, lowland river channels, as well as reservoirs. Ideal habitats comprise clear and slightly basic (pH: 7.5–8.08), oxygen-saturated water (10.02–11.38 mg/l) with a total hardness (82.39–72.52) and total dissolved solids under the desirable limits of 500 mg/l.

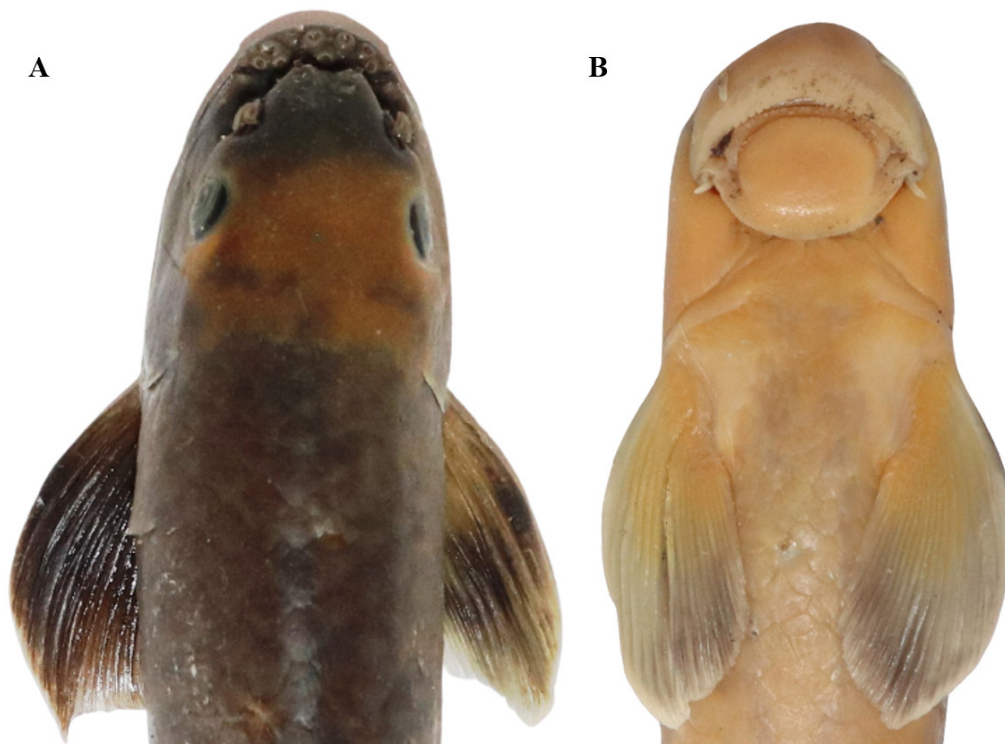


Image 1. *Garra birostris*, NUFM 1302, 113.1 mm SL, Dikhu River in Nagaland: A—dorsal view | B—ventral view. © Metevinu Kechu.



Image 2. *Garra birostris*, ZSI FF 7151, 67.12 mm SL, Doyang River in Nagaland: A—lateral view | B—dorsal view. © Metevinu Kechu.

DISCUSSION

Members of the genus *Garra* shows varied snout morphology (Nebeshwar & Vishwanath 2017). *Garra birostris* specimens collected as part of the present study belonged to group possessing a snout with proboscis

(bi-lobed) and a prominent transverse lobe as described by Nebeshwar & Vishwanath (2017). *Garra birostris* is rheophilic cyprinid with a flat belly and the lower lip expanded at its posterior rim to form an oval sucking pad and a greatly diminished vomero-palatine organ.

Table 1. Biometric data of *Garra birostris*. N—number of specimens | SD—standard deviation.

River	Doyang river (n = 04)			Dikhu river (n = 05)		
Locality	Liphiyan			Longleng, Yong		
Altitudes	371 m			371 m		
	Range	Mean	SD	Range	Mean	SD
Standard length (mm)	52.7–80.5			113.1–138.7		
In percent of standard length						
Head length	24.1–27.7	25.7	1.5	23.3–25.3	24.4	0.7
Body depth at dorsal fin origin	21.1–23.4	22.2	1.0	20.1–24.9	22.7	1.7
Predorsal length	45.6–47.7	46.4	0.9	44.5–47.4	46.1	1.1
Preanus length	66.3–70.9	68.7	1.9	67.4–72.8	69.4	2.0
Preanal length	59.8–78.3	72.1	8.3	75.1–78.2	76.1	1.2
Prepectoral length	21.9–46.1	28.8	11.6	19.9–23.1	21.7	1.5
Prepelvic length	48.3–53.6	50.7	2.2	49.1–52.3	50.5	1.2
Dorsal-fin base length	15.5–18.7	17.8	1.5	17.1–20.1	18.8	1.1
Dorsal-fin length	23.2–26.4	24.9	1.3	24.1–27.7	25.3	1.4
Pectoral-fin length	22.2–26.4	23.4	2.0	19.3–23.7	21.9	1.6
Pelvic-fin length	18.8–21.1	20.1	1.0	20.1–23.1	21.7	1.2
Anal-fin base length	6.4–9.4	7.5	1.4	7.1–10.0	8.3	1.1
Anal-fin length	18.6–20.7	19.6	1.0	20.3–22.0	21.1	0.8
Vent to anal distance	6.2–7.1	6.5	0.4	5.4–7.1	6.4	0.6
Caudal peduncle length	14.3–20.8	18.7	3.0	15.2–17.2	15.9	0.7
Caudal peduncle depth	12.5–13.8	13.1	0.6	12.3–14.1	13.1	0.6
Caudal fin length (upper lobe)	20.4–26.4	24.3	2.7	24.4–28.1	26.6	1.5
Disc length	9.5–10.8	10.1	0.6	6.3–10.5	8.4	1.6
Disc width	11.4–13.5	12.2	0.9	9.8–13.8	12.2	1.4
Pulvinus length	6.4–6.6	6.5	0.1	3.1–6.3	5.5	1.3
Pulvinus width	8.3–8.6	8.4	0.1	5.7–9.1	8.1	1.3
In percent of head length						
Head depth at occiput	59.7–75.1	68.8	6.8	67.4–72.1	69.9	1.8
Snout length	47.0–58.6	53.7	5.4	51.2–58.3	53.8	3.2
Interorbital width	33.7–44.8	41.7	5.3	37.9–43.5	41.1	2.1
Eye diameter	22.1–29.2	26.3	3.2	16.1–19.5	17.8	1.5
Disc length	37.4–41.2	39.2	1.6	26.4–43.3	34.5	6.6
Disc width	44.9–50.6	47.6	2.5	41.1–56.9	50.1	6.1
Pulvinus length	23.5–27.0	25.3	1.4	13.2–26.2	22.7	5.3
Pulvinus width	30.0–34.3	32.7	1.8	23.6–36.3	33.2	5.3
Meristic counts	N = 04			N = 05		
Dorsal-fin rays	ii8½			ii8½		
Pectoral-fin rays	i12–14			i14–15		
Pelvic-fin rays	i8			i8		
Anal-fin rays	ii5½			ii5½		
Pre-dorsal scales	10–11			10–11		
Lateral line scales	33–34			33–34		
Transverse scales	4½ 1 3½			4½ 1 3½		
Circumpeduncular scale rows	16			16		

Garra biloborostris (Roni & Vishwanath, 2017) and *Garra chathensis* (Ezung et al., 2020b) are the closest congeners of *Garra birostris* as they belong to the 'proboscis species-group' with a prominent bilobed proboscis (Nebeshwar & Vishwanath 2017). The presence of large tri- or tetra-cuspid acanthoid tubercles on each lobe in *G. birostris*, three acanthoid tubercles on each lobe in *G. biloborostris*, and large bicuspid acanthoid tubercles on each lobe in *G. chathensis* are the most important characters distinguishing the three species.

In the present study, *G. birostris* was identified based on the large, tri- to tetra-cuspid acanthoid tubercles on each lobe, having $4\frac{1}{2}|1|3\frac{1}{2}$ transverse scale rows and a black spot at the upper angle of the gill opening. Our specimens of *G. birostris* differed to a certain extent in the characters mentioned in the original description in having fewer dorsal fin rays $ii8\frac{1}{2}$ (vs $iii8\frac{1}{2}$) and anal fin rays $ii5\frac{1}{2}$ (vs $iii5\frac{1}{2}$) which may be to the result of differences in habitat physio-chemistry and climatic conditions.

The first record of *G. birostris* from Nagaland, adds yet another species to Nagaland's ichthyofauna. This species is locally known as Aaghungu in Sumi Naga dialect, Angad in Ao Naga dialect and Engoro in Lotha Naga dialect. The prevailing threats to the fish species and their habitat occur mostly due to over exploitation including using destructive fishing methods, various anthropogenic activities hazards, such as irrigation water for human needs and plastic waste discharge, and sand & boulder mining. Public awareness campaigns among the general public could be the most effective step toward preserving and conserving native fisheries resources. Anthropogenic activities must be regulated, especially those negatively impacting aquatic ecosystems and their resources. It is also necessary to conduct continued research to investigate and document the ichthyofauna in this region, especially from poorly-explored tributaries, as to develop sustainable exploitation and for conservation plans for the fish fauna.

Materials examined

Garra biloborostris: ZSI FF 7928, 2 paratypes, 69.1–75.6 mm; India, Assam, Chirang District, Kanamakra River, Brahmaputra basin, Sewali and Paraty.

Garra chathensis: ZSI FF 8037, holotype, 65.6 mm SL; India: Nagaland: Chathe River, Brahmaputra basin, Ezung et al. (2020)

Garra birostris: Data from Nebeshwar & Vishwanath (2013)

REFERENCES

- Basumatary, S., F. Jabeen, A. Dey, H. Choudhury, B. Talukdar, H.K. Kalita & D. Sarma (2017). Length-weight relationships of *Garra birostris* Nebeshwar & Vishwanath, 2013, *Garra annandalei* (Hora, 1921), *Johnius coitor* (Hamilton, 1822) and *Raiamas bola* (Hamilton, 1822) from the Brahmaputra River basin, Northeast India. *Journal of Applied Ichthyology* 33(6): 1242–1243.
- ESRI (2017). ArcGIS desktop and spatial analyst extension: release 10.5. Environmental Systems Research Institute; Redlands, CA.
- Ezung, S., B. Shangningam & P.P. Pankaj (2021). A new fish species of genus *Garra* (Teleostei: Cyprinidae) from Nagaland, India. *Journal of Threatened Taxa* 13(6): 18618–18623. <https://doi.org/10.11609/jott.6029.13.6.18618-18623>
- Ezung, S., S. Bungdon & P.P. Pankaj (2020). A new fish species of the genus *Garra* (Teleostei: Cyprinidae) from the Brahmaputra basin, Nagaland, India. *Journal of Experimental Zoology, India* 23(2): 1333–1339.
- Fricke, R., W.N. Eschmeyer & R. van der Laan (2018). Eschmeyer's Catalog of Fishes: genera, species, references, online version. California Academy of Sciences, San Francisco. Available from: <http://researcharchive.calacademy.org/research/ichthyology/catalog/fishcatmain.asp> (accessed 31 December 2020).
- Kottelat, M. (2020a). *Ceratogarra*, a genus name for *Garra cambodgiensis* and *G. fasciacauda* and comments on the oral and gular soft anatomy in labeonine fishes (Teleostei: Cyprinidae). *Raffles Bulletin of Zoology Supplement* No. 35: 156–178.
- Kottelat, M. (2000b). Diagnoses of a new genus and 64 new species of fishes from Laos (Teleostei: Cyprinidae, Balitoridae, Bagridae, Syngnathidae, Chauhuriidae and Tetraodontidae). *Journal of South Asian Natural History* 5: 37–82.
- Nebeshwar, K. & W. Vishwanath (2013). Three new species of *Garra* (Pisces: Cyprinidae) from north-eastern India and redescription of *G. gotyla*. *Ichthyological Exploration of Freshwaters* 24(2): 97–120.
- Nebeshwar, K. & W. Vishwanath (2017). On the snout and oromandibular morphology of genus *Garra*, description of two new species from the Koladyne River basin in Mizoram, India, and redescription of *G. manipurensis* (Teleostei: Cyprinidae). *Ichthyological Exploration of Freshwaters* 28(1): 17–53.
- Roni, N. & W. Vishwanath (2018). A new species of the genus *Garra* (Teleostei: Cyprinidae) from the Barak River drainage, Manipur, India. *Zootaxa* 4374(2): 263–272.
- Roni, N. & W. Vishwanath (2017). *Garra biloborostris*, a new labeonine species from north eastern India (Teleostei: Cyprinidae). *Vertebrate Zoology* 67(2): 133–137.
- Stiassny, M. L. & A. Getahun (2007). An overview of labeonin relationships and the phylogenetic placement of the Afro-Asian genus *Garra* Hamilton, 1922 (Teleostei: Cyprinidae), with the description of five new species of *Garra* from Ethiopia, and a key to all African species. *Zoological Journal of the Linnean Society* 150(1): 41–83.
- Thoni, R.J., D.B. Gurung & R.L. Mayden (2016). A review of the genus *Garra* Hamilton 1822 of Bhutan, including the descriptions of two new species and three additional records (Cypriniformes: Cyprinidae). *Zootaxa* 4169(1): 115–132.
- Vishwanath, W. (2017). Diversity and conservation status of freshwater fishes of the major rivers of northeast India. *Aquatic Ecosystem Health & Management* 20(1–2): 86–101. <https://doi.org/10.1080/14634988.2017.1294947>
- Zhang, E. & Y.Y. Chen (2002). *Garra tengchongensis*, a new cyprinid species from the upper Irrawaddy River basin in Yunnan, China (Pisces: Teleostei). *Raffles Bulletin of Zoology* 50(2): 459–464.



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. Chandrashekher 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, SACON, 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, SACON, 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, SACON, 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 pausivity 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)

July 2022 | Vol. 14 | No. 7 | Pages: 21331–21486

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

DOI: 10.11609/jott.2022.14.7.21331-21486

Articles

The Javan Leopard *Panthera pardus melas* (Cuvier, 1809) (Mammalia: Carnivora: Felidae) in West Java, Indonesia: estimating population density and occupancy

– Anton Ario, Senjaya Mercusiana, Ayi Rustiadi, Robi Gumilang, I Gede Gelgel Darma Putra Wirawan & Toni Ahmad Slamet, Pp. 21331–21346

Breeding phenology and population dynamics of the endangered Forest Spiny Reed Frog *Afrivalus sylvaticus* Schiøtz, 1974 in Shimba Hills, Kenya

– Alfayo Koskei, George Eshiamwata, Bernard Kirui & Phylus K. Cheruiyot, Pp. 21347–21355

Ichthyofaunal diversity of Senkhi stream, Itanagar, Arunachal Pradesh: a comparative status between 2004–05 and 2018–19

– Koj Taro, Lakpa Tamang & D.N. Das, Pp. 21356–21367

First record of *Proceratium* Roger, 1863, *Zasphinctus* Wheeler, 1918, and *Vollenhovia* Mayr, 1865 (Hymenoptera: Formicidae) from the Western Ghats of peninsular India, description of three new species, and implications for Indian biogeography

– Kalesh Sadasivan & Manoj Kripakaran, Pp. 21368–21387

Communications

New queen? Evidence of a long-living Jaguar *Panthera onca* (Mammalia: Carnivora: Felidae) in Tikal National Park, Guatemala

– Carlos A. Gaitán, Manolo J. García, M. André Sandoval-Lemus, Vivian R. González-Castillo, Gerber D. Guzmán-Flores & Cristel M. Pineda, Pp. 21388–21395

First camera trap record of Striped Hyena *Hyaena hyaena* (Linnaeus, 1758) (Mammalia: Carnivora: Hyainidae) in Parsa National Park, Nepal

– Pramod Raj Regmi, Madhu Chetri, Haribhadra Acharya, Prakash Sigdel, Dipendra Adhikari, Naresh Subedi & Babu Ram Lamichhane, Pp. 21396–21401

Range extension and new ecoregion records of the Crocodile Monitor *Varanus salvadorii* (Peters & Doria, 1878) (Reptilia: Varanidae) in Papua New Guinea

– Borja Reh & Jim Thomas, Pp. 21402–21408

A checklist of fish and shellfishes of the Poonthura estuary, southwestern coast of India

– Kiranya Bella, Pramila Sahadevan, Giri Bhavan Sreekanth & Rajeev Raghavan, Pp. 21409–21420

A new species of *Protosticta* Selys, 1885 (Odonata: Zygoptera: Platystictidae) from Western Ghats, India

– Kalesh Sadasivan, Vinayan P. Nair & K. Abraham Samuel, Pp. 21421–21431

A case study on utilization and conservation of threatened plants in Sechu Tuan Nalla Wildlife Sanctuary, western Himalaya, India

– Puneet Kumar, Harminder Singh & Sushil Kumar Singh, Pp. 21432–21441

A survey of ethno-medicinally important tree species in Nauradehi Wildlife Sanctuary, central India

– Tinku Kumar, Akash Kumar, Amit Jugnu Bishwas & Pramod Kumar Khare, Pp. 21442–21448

Short Communications

Effects of a Bengal Slow Loris *Nycticebus bengalensis* (Primates: Lorisidae) bite: a case study from Murlen National Park, Mizoram, India

– Amit Kumar Bal, Anthony J. Giordano & Sushanto Gouda, Pp. 21449–21452

First record of *Garra birostris* Nebeshwar & Vishwanath, 2013 (Cypriniformes: Cyprinidae) from Doyang and Dikhu rivers of Brahmaputra drainage, Nagaland, India

– Sophiya Ezung, Metevinu Kechu & Pranay Punj Pankaj, Pp. 21453–21457

Two new records of Lilac Silverline *Apharitis lilacinus* (Lepidoptera: Lycaenidae) from northeastern India

– Monsoon Jyoti Gogoi, Ngulkhohal Khongsai, Biswajit Chakdar & Girish Jathar, Pp. 21458–21461

Illustrated description of the mantis *Mesopteryx platycephala* (Mantodea: Mantidae) collected from West Bengal, India

– Gauri Sathaye, Sachin Ranade & Hemant Ghate, Pp. 21462–21466

***Cetrelia isidiata* (Asahina) W.L. Culb. & C.F. Culb. (Parmeliaceae) – an addition to the Indian lichen biota**

– Gaurav K. Mishra, Pooja Maurya & Dalip K. Upreti, Pp. 21467–21469

Notes

A new southern distribution record for Pacific Marten *Martes caurina*

– Maximilian L. Allen, Brianne Kenny, Benjamin Crawford & Morgan J. Farmer, Pp. 21470–21472

First Asian record of Light-mantled Albatross *Phoebastria palpebrata* (Foster, 1785) from Rameswaram Island, Tamil Nadu, India

– H. Byju & N. Raveendran, Pp. 21473–21475

***Salvia misella* Kunth (Lamiaceae) - a new record for Eastern Ghats of India**

– Prabhat Kumar Das, Pradeep Kumar Kamila & Pratap Chandra Panda, Pp. 21576–21579

***Salsola oppositifolia* Desf. in Great Rann of Kachchh, Gujarat – a new record for India**

– Rakesh Gujar, Vinesh Gamit, Ketan Tatu & R.K. Sugoora, Pp. 21580–21483

Extended distribution of *Impatiens scapiflora* (Balsaminaceae) to the flora of Eastern Ghats, India

– T.S. Saravanan, S. Kaliamoorthy, M.Y. Kamble & M.U. Sharief, Pp. 21484–21486

Publisher & Host

