

Building evidence for conservation globally

Journal of Threatened Taxa

10.11609/jott.2023.15.4.22927-23138

www.threatenedtaxa.org

26 April 2023 (Online & Print)

15(4): 22927-23138

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

43/2 Varadarajulu Nagar, 5th Street West, Ganapathy, Coimbatore, Tamil Nadu 641006, India
Registered Office: 3A2 Varadarajulu Nagar, FCI Road, Ganapathy, Coimbatore, Tamil Nadu 641006, 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),
43/2 Varadarajulu Nagar, 5th Street West, Ganapathy, Coimbatore, Tamil Nadu 641006, India

Deputy Chief Editor

Dr. Neelesh Dahanukar

Noida, Uttar Pradesh, India

Managing Editor

Mr. B. Ravichandran, WILD/ZOO, Coimbatore, Tamil Nadu 641006, 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 641006, India

Dr. B.A. Daniel, ZOO/WILD, Coimbatore, Tamil Nadu 641006, 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

Ms. Sindhura Stothra Bhashyam, Hyderabad, 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 2020–2022

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, Department of Plant and Soil Science, Texas Tech University, Lubbock, Texas, USA.

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. Karthigeyan, 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. A.G. Pandurangan, Thiruvananthapuram, Kerala, 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. Ghatge, Modern College, Pune, India

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

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

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: Mauve Stinger *Pelagica noctiluca* by Swaathi Na. Medium used is soft pastels and gelly roll.



The giant clam commensal shrimp *Anchistus miersi* (de Man, 1888) (Decapoda: Palaemonoidae) new to Lakshadweep Sea, India

Manu Madhavan¹ , Purushothaman Paramasivam² , S. Akash³ , T.T. Ajith Kumar⁴
& Kuldeep Kumar Lal⁵

^{1–5} ICAR – National Bureau of Fish Genetic Resources, Canal Ring Road, P.O. Dilkusha, Lucknow, Uttar Pradesh 226002, India.

^{1,4} Kerala University of Fisheries and Ocean Studies, Kochi, Kerala 682506, India.

¹manumadhavan060@gmail.com, ²purushothgene@gmail.com, ³akash03jack@gmail.com

⁴ttajith87@gmail.com (corresponding author), ⁵kuldeepklal@gmail.com

This article is dedicated to the late Dr. P. Purushothaman, the second author.

Abstract: The genus *Anchistus* Borradaile, 1898 is a colourful shrimp from the commensal group. In this study, we are reporting a new occurrence of Giant Clam commensal shrimp *Anchistus miersi* (de Man, 1888 [in de Man, 1887–1888]) caught from Agatti Island, Lakshadweep Sea during February 2020. The present specimens (one each matured male and female) were collected from the mantle cavity of the Giant Clam, *Tridacna maxima* (Roding, 1798) in the coral lagoon at a depth of 4 m. *Anchistus miersi* is morphologically very similar to *Anchistus demani*, which is easily distinguished by the presence of a strong antennal spine and conspicuous accessory spinules in the third–fifth pereopods and presence of small blue spots all over the body. The molecular analysis confirms that, the morphological identification of the present Indian specimens displays an intraspecific genetic divergence of 0.3–1.2%. Besides, the remarkable taxonomic features and colour patterns, distributional ranges are also attested with the report of the species from the present area.

Keywords: Agatti Island, distributional range, giant clam association, Lakshadweep, morphology.

Editor: V. Deepak Samuel, National Centre For Sustainable Coastal Management, Chennai, India.

Date of publication: 26 April 2023 (online & print)

Citation: Madhavan, M., P. Paramasivam, S. Akash, T.T.A. Kumar & K.K. Lal (2023). The giant clam commensal shrimp *Anchistus miersi* (de Man, 1888) (Decapoda: Palaemonoidae) new to Lakshadweep Sea, India. *Journal of Threatened Taxa* 15(4): 23083–23090. <https://doi.org/10.11609/jott.7444.15.4.23083-23090>

Copyright: © Madhavan et al. 2023. 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: Funding for this study is extended by the Centre for Marine Living Resources and Ecology, MoES Govt. of India, through the project ‘Mainstreaming marine ornamental shrimp diversity for actions to enhance livelihood and gender empowerment opportunities among native Lakshadweep communities’ (MoES/CMLRE/MLRE/GIA/2002/Genl.).

Competing interests: The authors declare no competing interests.

Author details: Manu Madhavan is working as PhD, research scholar at the ICAR-National Bureau of Fish Genetic Resources. Purushothaman Paramasivam is a researcher at the ICAR-National Bureau of Fish Genetic Resources. S. Akash is working as PhD, research scholar at the ICAR-National Bureau of Fish Genetic Resources. T.T. Ajith Kumar is working as principal scientist at the ICAR-National Bureau of Fish Genetic Resources. He known for his contribution to marine ornamental aquaculture for conservation and livelihood. Kuldeep Kumar Lal was the former director of the ICAR-National Bureau of Fish Genetic Resources and presently the director of the ICAR - Central Institute Brackishwater Aquaculture, have vast experience in conservation genetics.

Author contributions: MM—animal collection and morphological identification of the specimen. PP—species confirmation by morphological and molecular analysis and preparation of the manuscript. SK—animal collection and morphological identification of the specimen. TTAK—manuscript revision. KKL—conceptualization.

Acknowledgements: The authors are thankful to the director, ICAR-NBFG for the facilities and encouragement. They are grateful to the Centre for Marine Living Resources and Ecology, MoES, Govt. of India, for funding support. We are also extending thanks to the Department of Fisheries, Administration of Lakshadweep, for local logistical support.



INTRODUCTION

The shrimp fauna of Indian waters was studied majorly in the zones of western and eastern coasts. The insight knowledge on the caridean shrimps from Lakshadweep waters is still very narrow with the current status. Recently, a few surveys have exposed new distributional coral-associated carideans (Baby et al. 2016; Bharathi et al. 2019; Madhavan et al. 2019; Akash et al. 2020; Prakash & Marimuthu 2020).

In general, some of the palaemonid shrimps are endo-commensal species, enticing and fascinating in their colour patterns. These shrimps inhabit mantle cavities and gastric regions of host organisms such as sponges, bivalves, and tunicates (Kemp 1922; Johnson & Liang 1966; Bruce 1977; De Grave 1999). The genus *Anchistus* Borradaile, 1898 is one such taxa and has been symbolized as a commensal group, usually associated with bivalves (mostly in the subfamily Tridacninae) (Bruce 1972, 2000; Jayachandran 2001). In the symbiotic relationship, the giant clam gain benefits from the shrimps with cleaning service, which helps to maintain the health of its tissues. Simultaneously, the shrimps get benefits from the giant clams like safety from predator, stable environment, as well as access to food. This symbiotic relationship was dynamic and can change over time. For example, a cleaner shrimp may become a parasite, if it begins feeding on the giant clam's tissues rather than just its parasites.

Typically, this genus covers seven species which are distributed in the Indo-Pacific regions at shallow water depths (Jayachandran 2001; De Grave & Fransen 2011). Four species are reported from the Indian waters notably in Andaman and Nicobar Islands; *Anchistus custos* (Forskål, 1775), *A. demani* Kemp, 1922, *A. miersi* (de Man, 1888 [in de Man, 1887–1888]), and *Anchistus pectinis* Kemp, 1925 (Samuel et al. 2016). The morphological features of *Anchistus* are distinguished from other groups of palaemonid shrimps by the presence of their movable spine in the lateral border of uropods, rostrum downwards, laterally compressed and extended to the distal end of eyes. Also, the distolateral spine of antennal scaphocerite is not overreaching the distal margin and has a convex structure in the inner margin of the dactylus of 3rd pereopods.

During the recent survey undertaken at Lakshadweep waters, a pair of *Anchistus* specimens were collected at shallow depth lagoon regions of Agatti Island. These specimens were carefully examined and have been identified as *A. miersi*, which is a new distributional record to the Lakshadweep Sea. The authors also

provided taxonomic notes on morphological and molecular features, habitat, and coloration of this species in a unique manner.

MATERIALS AND METHODS

Sampling

A pair of *A. miersi* specimens were caught out from the mantle cavity of the Giant clam, *T. maxima* (Roding, 1798) from the lagoon area of Agatti island at the depth of 4 m (10.8533N & 72.1872E; Image 1). The specimens were picked up using a hand net during snorkeling in the reef region of the lagoon. The specimens were transferred alive to the Germplasm Resource Centre of the ICAR - National Bureau of Fish Genetic Resources (NBFGR) located at Agatti, Lakshadweep, India for further analysis. After transportation, the colouration of the species was captured with a camera (Canon G1X), followed by maintaining the specimens in live condition. However, mortality was noticed on the second day, it might be happened due to the absence of host organisms. Further, the dead specimens were preserved in 95% of ethanol for detailed morphological examination.

Morphology

The preserved specimens were taken to the Peninsular and Marine Fish Genetic Resources (PMFGR) Centre of the ICAR-NBFGR, Kochi, India for further studies. Careful examination with a stereo zoom microscope (0.5–8X) with Nikon SMZ1270 digital camera has been carried out. A compound microscope, Leica ICC50 was used for observation of dactylus and mouth structures. The illustrative images for morphological characteristics were drawn using the GNU Image Manipulation Program (Version 2.10.12) and edited with Adobe Photoshop CS2. The morphological identification and diagnosis were carried out by following the literature of Holthuis (1952), Bruce (1973), and Jayachandran (2001). The examined material was deposited in the National Fish Museum and Repository of the ICAR-NBFGR, Lucknow, India. The measurement of carapace length (CL) was taken from the posterior orbit angle to the posterior margin of the cephalothorax with Vernier caliper (0.1 mm accuracy). The measure of CL is considered as a standard length for both individuals.

DNA barcoding

The partial sequences of barcoding gene mitochondrial cytochrome c oxidase I (COI) data were generated for this species adopting Akash et al. (2020).

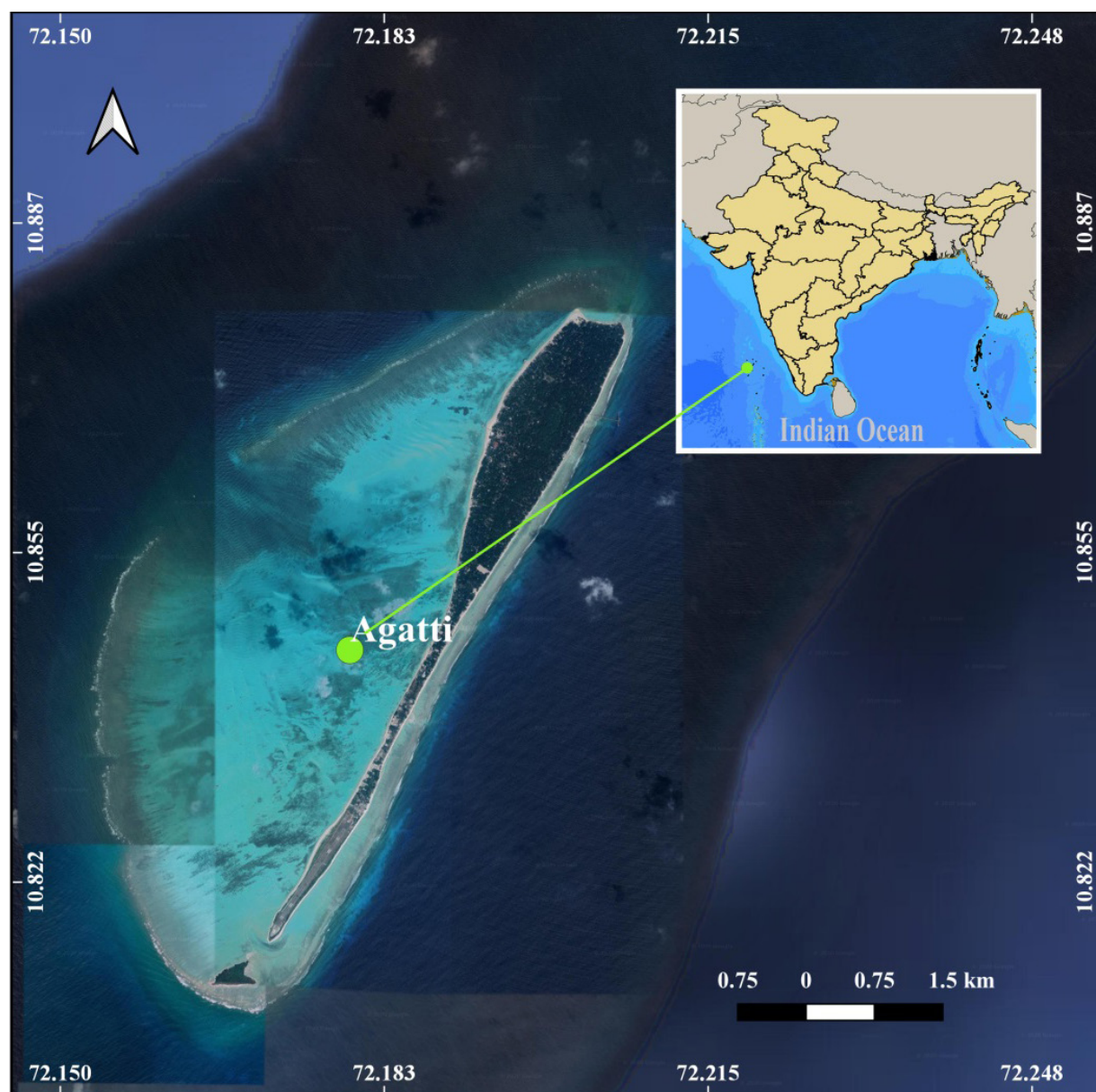


Image 1. Collection site of *Anchistus miersi* (de Man, 1888 [in de Man, 1887–1888]) from a Giant clam, *Tridacna maxima* at Agatti island, Lakshadweep, India.

BioEdit software v. 5.0.9 (Thompson et al. 1994) was used to align and correct the sequence data. The corrected sequences were blasted in Blastn (<https://blast.ncbi.nlm.nih.gov/Blast.cgi>) of NCBI to find out similarity ranges. 12 COI sequences of *Anchistus* species were retrieved from NCBI (<https://www.ncbi.nlm.nih.gov/>) and were used in this analysis. MEGA X software was used to estimate the pairwise genetic distances and reconstruct the Maximum Likelihood (ML) tree (Kumar et al. 2018) with the implementation of 1,000 replications.

Taxonomic Status

Order Decapoda Latreille, 1802

Infraorder Caridea Dana, 1852

Superfamily Palaemonoidea Rafinesque, 1815

Family Palaemonidae Rafinesque, 1815

Genus *Anchistus* Borradaile, 1898

Species *Anchistus miersi* (de Man, 1888 [in de Man, 1887–1888]) (Images. 2, 3 & 4)

Harpilius miersi De Man, 1888 : 274, Plate 17, figs 6–10 [type locality : Elpninstone Island. Mergui Archipelago. Burma].

A. miersi. – Holthuis. 1952 : 110–111, Fig 45. – Bruce, 1973 : 136, Fig. 1c–e. – Monod, 1976 : 24–26, figs 29–36. De Grave, 1999: 132–133.

Material examined

NBFR/PALAMIE.01, female (CL: 3.0 mm, ID no: DBTLD224) and 1 male (CL 2.5 mm, ID no: DBTLD186), coral reef lagoon at Agatti Island, Lakshadweep, Arabian Sea, Indian Ocean (10.8533N & 72.1872E), 4 m depth, associated with *T. maxima*, temperature 28.2°C, Salinity 35 ppt, February 2020.

Diagnosis

Carapace (Image 2) glabrous and more or less dorsally convex with a strong antennal tooth. Rostrum Fig 1A) short and directed downwards, slightly reaching the distal end of second antennular peduncle; terminal end rounded and bearing 2–3 teeth on the upper border, ventral of the terminal end rounded with few plumose setae. Abdomen tergites dorsally rounded and somewhat compressed. The posteroventral angle of the 4th & 5th somite rounded, 6th somite bearing a strong tooth in postero-ventrally. The nature of the telson smooth and thin, about 1.6 times as long as 6th abdominal somites, and bears two pairs of dorsolateral spines; terminal end rounded and bears with small 4 pairs of posterior-distal spines (Figure 1B). Uropod rounded posteriorly and bearing with a movable tooth in the lateral side, slightly exceeded in the distal end of telson. Basal antennular peduncle (Figure 1C) with anterolateral tooth, second and third segments short. Stylocerite acute distally and exceeding to middle of the first antennular segment; both flagella almost equal, upper antennular flagellum fused with 13 segments and free ramus with 11 segmented, which has few hairy setae in distally. The antennal scale (Figure 1D) with a strong anterolateral spine, and distinctly exceeded distal end with few long plumose setae. Third maxilliped with well-developed exopod; the antepenultimate segment about 1.5 times as long as the penultimate segment with few lateral setae, ultimate segment short and fringed with numerous setae. The first pereopod slender, merus slightly longer than carpus. The ventral side of the carpus with few long setae and fingers with nine groups of setae present dorsally. Second pereopods (Image 2) symmetrical, carpus short, and triangle-shaped with palm stout, dactylus curved hook like structure at anteriorly and proximally with strong tooth and few small teeth; female pereopods somewhat similar in length, dactylus about 0.5 lengths of palm, whereas in male, major dactylus is about 0.5 in the length of the palm and minor dactylus is 0.64 length of the palm.



Image 2. Picture representation of *Anchistus miersi* (de Man, 1888 [in de Man, 1887–1888]) collected from Agatti island, Lakshadweep, India (Ethanol preserved). © Purushothaman Paramasivam.

Pereopods III–VI (Figure 1E–J) similar in size; propodus have few long setae at the distal end, their dactylus short and hook like structure with a microscopic tooth in flexor margin. The third and fourth pereopods stout and similar in structures, merus about 2.3 times as long as carpus; propodus subequal to merus, about 7.3 lengths of dactylus. Fifth pereopods slightly compressed, merus about 1.9 times as long as carpus, propodus about 1.1 times as long as merus, 2.1 times as long as carpus, and 8.5 times of dactylus.

Colouration in life

The body and appendages are commonly translucent with scattered small blue spots (Image 3). Rostrum with few blue dots, antennal scale, and antennular peduncle with blue spots, but flagellum is transparent. The second pereopods are translucent with lined blue dots dorsally. The third–fifth pereopods are transparent without any marks. Eyes are translucent with small dark blue dots in eyestalk, cornea with dark black with translucent. The ovary is greenish.

Habitat and Distribution

The present species was caught from the mantle cavity of the Giant clam, *T. maxima* (Röding, 1798) (Image 4) in the lagoon region of Agatti island (10.8533N & 72.1872E), Lakshadweep at the depth of 4 m. *A. miersi* is widely distributed in Indo-Pacific regions, ranging from the Red Sea, eastern Africa to the Gambier Archipelago through Maldives and Chagos Islands, Seychelles; Zanzibar, Kenya, Tanganyika, Madagascar, Andaman Islands, and the Philippines. In common, this species is associated with the *Tridacna* clam (subfamily Tridacninae). However,

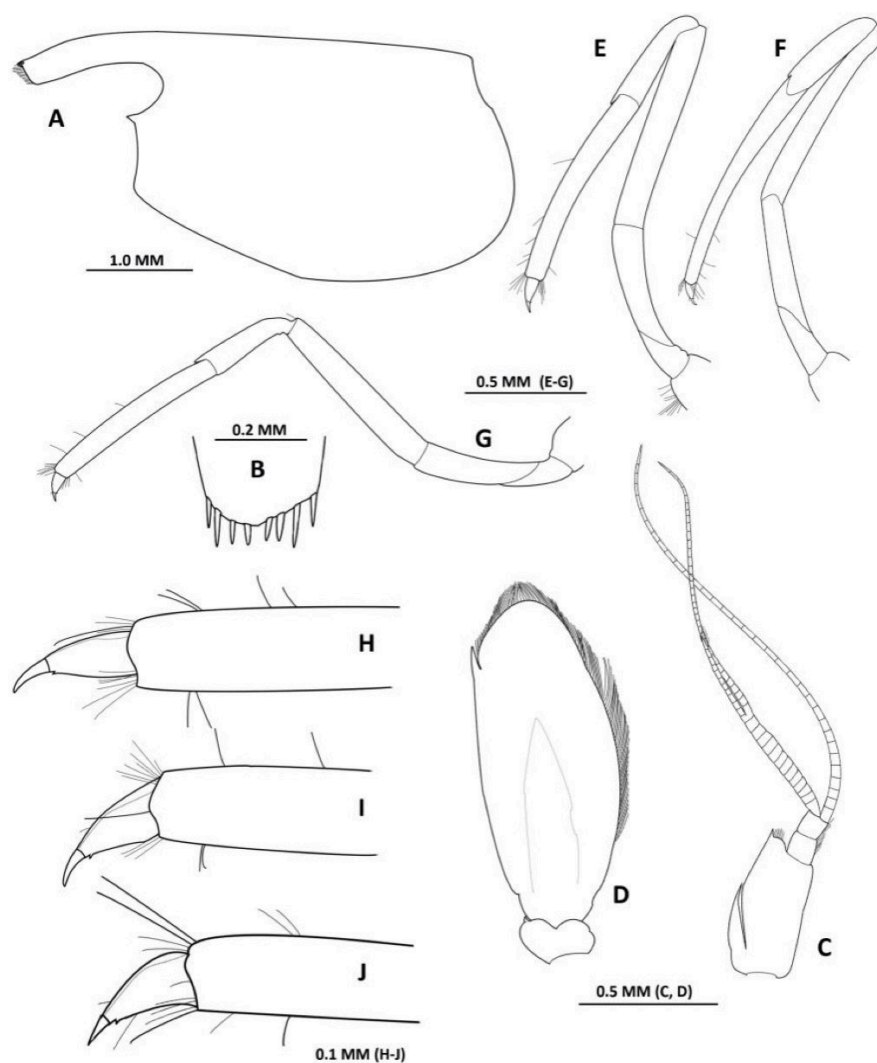


Figure 1. *Anchistus miersi* (de Man, 1888 [in de Man, 1887–1888]) from Agatti Island, Lakshadweep, India: A—Lateral view of carapace | B—Posterior end of the telson (Closer view) | C—Dorsal view of antennular peduncle | D—Dorsal view of antennal scale | E—Lateral view of the third pereopod | F—Lateral view of forth pereopod | G—Lateral view of the fifth pereopod | H–J—Closer view of dactylus of Last three pereopods.

it also occurred within bivalve of the genera *Hippopus*, *Pinna*, *Magnavacula*, and *Meleagrina* (Bruce 1978; Chace & Bruce 1993; De grave 1999; Neo et al. 2014).

Remarks

The present Indian specimens were agreed well with previous descriptions of De Man (1888) and Kemp (1922) with their key characteristics of Jayachandran (2001) with carapace and architecture of rostrum, presence of antennal spines, dactylus dentation of second pereopods, and its colour patterns. The general appearance of the Indian materials is similar with earlier finding, but a female individual is bigger than the male. Also, some remarkable differences were noticed in the present organisms, upper antennular flagellum fused

with 13 segments and free ramus segmented with 11 articles (where de Man mentioned few segments fused in basally), the antepenultimate segment of third maxilliped is broader much than the penultimate segment. Dactylus of ambulatory pereopods with hook-like distal end with a microscopic tooth in flexor margin, fifth pereopod slightly compressed and longer than third and fourth pereopods. However, minute spinules or granules were not able to observe on the anterior border on the dactylus, where Fujino (1975) described the minute granules with the help of scanning electron microscopy.

The present individuals of *A. miersi* had an appealing colour pattern in their overall body with transparent and small dark blue spots, which also agree well with the previous descriptions of Bruce (1976) and Neo et

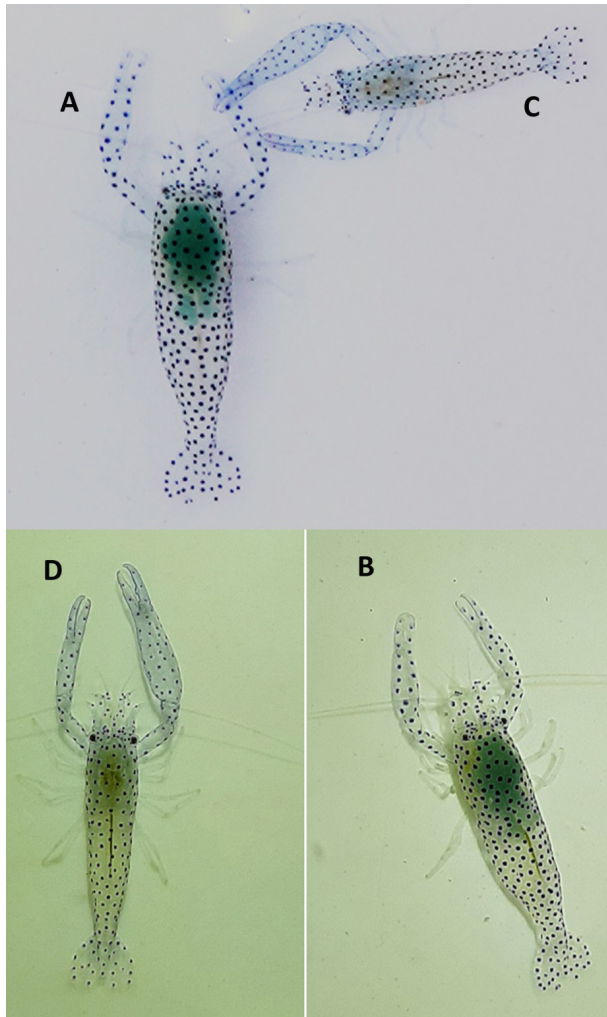


Image 3. The live colouration of *Anchistus miersi* (de Man, 1888 [in de Man, 1887–1888]) from Agatti Island, Lakshadweep, India: A–B—Female | C–D—Male. © Purushothaman Paramasivam.

al. (2014). However, he has noticed two different colour spots (red and blue) over the body and appendages. Commonly, *Anchistus* shrimps live as pairs in the host animals, especially bivalves (Bruce 1975; Fujino 1975). This colour variation is caused due to sexual dimorphism and based on their dwelling habitats (Bruce 1976). De Grave (1999) reported red dots and transparent colour in both the animals obtained from the Hansa Bay associated with *Magnavacula penguin* at the depth of 19 m. Neo et al. (2015) also noticed red dots in the male organism, wherein female blue dots were noticed, which were associated with a fluted giant clam, *Tridacna squamosa* from Singapore waters. In the present study, both the sex had dark blue spots in the body, which were associated with Giant clam, *T. maxima* from Agatti Island, Lakshadweep. In morphological and colour patterns wise, *A. miersi* is closely related to *A. demani*.



Image 4. A Giant Clam *Tridacna maxima* at Agatti island, Lakshadweep, India, where *Anchistus miersi* was collected. © Purushothaman Paramasivam.

However, *A. miersi* differed by the presence of a strong antennal spine (vs absent in *A. demani*), very minute and conspicuous accessory spinules in the third-fifth pereopods (vs inconspicuous and blunt in *A. demani*). The colour patterns also differed between these two species, small blue spots over the body for *A. miersi* and comparatively bigger in size of blue spots for *A. demani* individuals (Kemp 1922; Jayachandran 2001).

DNA Barcoding

The COI DNA barcoding has been commonly applied for revealing cryptic species complex, taxonomic ambiguities, delineating species boundaries of crustaceans (Hebert et al. 2003; Schwentner et al. 2013; Chan et al. 2017). The present study generated two COI sequences for Indian materials of *A. miersi* with greater than 650 bp (Accession No: MW897781 & MW897782). The NCBI has only 12 COI sequences of the *Anchistus* species, which have been retrieved and used for the present analysis where, two sequences are from *A. australis*, four from *A. miersi*, and another four from *A. custoides*. It should also be noted that the sequences of *A. demani* (KP759379 & KC706757) are not used for the present analysis due to the close homogeneity with the sequences of *A. miersi*. It reveals that misidentified sequences are there in NCBI for *A. demani* (KP759379 from Madagascar and KC706757 from French Polynesia), which have >99.5% sequences similarity with the present Indian materials of *A. miersi*. Overall, the present study reveals that the intraspecific genetic divergence for *A. miersi* is 0.3–1.2 % and the highest interspecific divergences were showed between these three species which ranged from 9.7–23.9% (Table 1). On the other hand, a sequence of *A. custoides* (MH287043) showed the greatest intraspecific divergences with the Malaysian materials (Fransen & Reijnen 2012) which has to be restudied with integrative

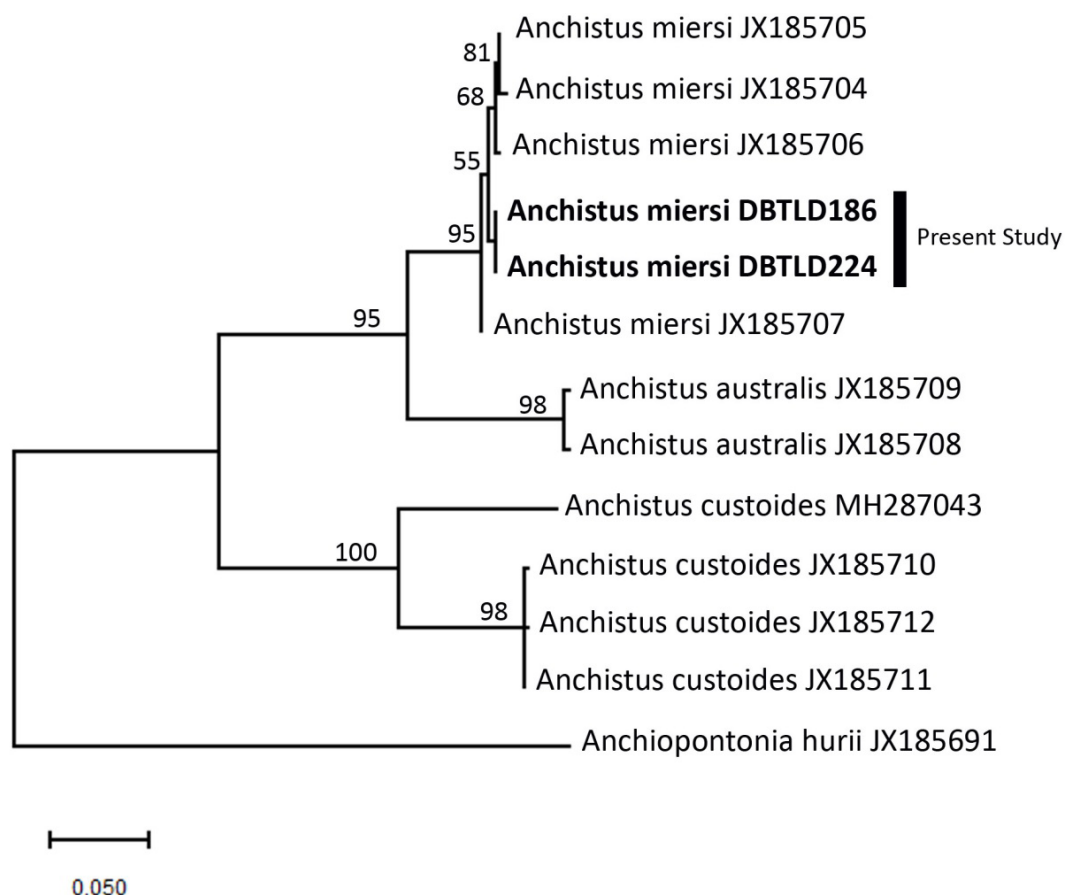


Figure 2. Picture representation of *Anchistus miersi* (de Man, 1888 [in de Man, 1887–1888]) collected from Agatti island, Lakshadweep, India (Ethanol preserved).

Table 1. Pairwise genetic distances for *Anchistus* species using COI gene sequence data.

	Species	1	2	3	4	5	6	7	8	9	10	11	12
1	<i>Anchistus miersi</i> JX185707												
2	<i>Anchistus miersi</i> JX185706	0.008											
3	<i>Anchistus miersi</i> JX185705	0.008	0.003										
4	<i>Anchistus miersi</i> JX185704	0.012	0.007	0.003									
5	<i>Anchistus miersi</i> DBTLD224	0.007	0.008	0.008	0.012								
6	<i>Anchistus miersi</i> DBTLD186	0.007	0.008	0.008	0.012	0.000							
7	<i>Anchistus custoides</i> JX185712	0.221	0.227	0.230	0.237	0.221	0.221						
8	<i>Anchistus custoides</i> JX185711	0.217	0.224	0.227	0.233	0.217	0.217	0.002					
9	<i>Anchistus custoides</i> JX185710	0.221	0.227	0.230	0.237	0.221	0.221	0.003	0.002				
10	<i>Anchistus australis</i> JX185709	0.097	0.097	0.101	0.106	0.101	0.101	0.239	0.239	0.242			
11	<i>Anchistus australis</i> JX185708	0.099	0.099	0.104	0.108	0.104	0.104	0.229	0.229	0.232	0.005		
12	<i>Anchistus custoides</i> MH287043	0.201	0.196	0.199	0.204	0.196	0.196	0.125	0.122	0.120	0.227	0.224	

approaches in the future. Additionally, the phylogenetic tree constructed with the Maximum Likelihood analysis for available sequences among the *Anchistus* species is represented in Figure 2. The *A. miersi* sequences from

India formed a clade with the other sequences of *A. miersi* which were retrieved from NCBI and it confirms the morphological identification of the present Indian materials.

Overall, the present study reports new occurrence of small commensal shrimp associated with Giant clam, *T. maxima* (Roding 1798) in the lagoon regions of Agatti Island, Lakshadweep at the depth of 4 m, which distribution extended Andaman Sea–Lakshadweep Sea towards. Additionally, taxonomic, habitat details are represented discussed in detail. The present report is also strengthening the caridean fauna of the Lakshadweep waters.

REFERENCES

- Akash, S., P. Purushothaman, M. Madhavan, C. Ravi, T.J. Hisham, M. Sudhakar, T.T.A. Kumar & K.K. Lal (2020). *Urocaridella arabianensis* n. sp., a new palaemonid shrimp (Crustacea, Decapoda, Palaemonidae) from Lakshadweep Islands, India with taxonomic comparison on the genus *Urocaridella* Borradaile, 1915. *Zootaxa* 4816(1): 49–66. <https://doi.org/10.11646/zootaxa.4816.1.2>
- Baby, S.T., S. Ghosh, G. Mohan, S.S. Cubelio & M. Sudhakar (2016). Occurrence of Marbled Shrimp *Saron marmoratus* (Olivier, 1811) (Decapoda: Caridea: Hippolytidae) in Lakshadweep Archipelago, India. *Proceedings of the Zoological Society* 69(1): 157–160. <https://doi.org/10.1007/s12595-015-0136-9>
- Bharathi, S., P. Purushothaman, S. Akash, S. Jose, M. Madhavan, A. Dhinakaran, T.T.A. Kumar & K.K. Lal (2019). *Periclimenella agattii* sp. nov., a new palaemonid shrimp (Crustacea, Decapoda, Palaemonidae) from Lakshadweep Islands, India. *Zootaxa* 4706(3): 483–493. <https://doi.org/10.11646/zootaxa.4706.3.9>
- Borradaile, L.A. (1898). XLIII.—A revision of the Pontoniidae. *Journal of Natural History* 2(11): 376–391.
- Bruce, A.J. (1972). Shrimps that live with molluscs. *Sea Frontiers* 18(4): 218.
- Bruce, A.J. (1973). The pontoniid shrimps collected by the Yale Seychelles expedition, 1957–1958 (Decapoda, Palaemonidae). *Crustaceana* 24(1): 132–142.
- Bruce, A.J. (1975). Coral reef shrimps and their colour patterns. *Endeavour* 34: 23–27
- Bruce, A.J. (1976). Shrimps and prawns of coral reefs, with special reference to commensalism. *Biology and Geology of Coral Reefs* 3: 37–94.
- Bruce, A.J. (1977). Pontoniine shrimps in the collection of the Australian Museum [chiefly from Queensland; description, taxonomy]. *Records of the Australian Museum* 32: 39–81.
- Bruce, A.J. (1978). *Paranchistus pycnodontae* sp. nov., a new pontoniine shrimp associated with an ostreid bivalve host. *Memoirs of the Queensland Museum* 18(2): 233–242.
- Bruce, A.J. (2000). Biological observations on the commensal shrimp *Paranchistus armatus* (H. Milne Edwards) (Crustacea: Decapoda: Pontoniinae). *Beagle: Records of the Museums and Art Galleries of the Northern Territory* 16: 91–96.
- Chace, F.A. Jr. & A.J. Bruce (1993). The caridean shrimps (Crustacea: Decapoda) of the Albatross Philippine expedition, 1907–1910, Part 6: Superfamily Palaemonoidea. *Smithsonian Contributions to Zoology* 543: 1–152.
- Dana, J.D. (1852). Conspectus of the Crustacea of the Exploring Expedition under Capt. C. Wilkes, U.S.N. Paguridea, continued, Megalopidea and Macroura. *The American Journal of Science and Arts* series 2(14): 116–125.
- De Grave, S. (1999). Pontoniinae (Crustacea: Decapoda: Palaemonidae) associated with bivalve molluscs from Hansa Bay, Papua New Guinea. *Bulletin de l'Institut Royal Des Sciences Naturelles de Belgique, Biologie* 69: 125–141.
- De Grave, S. & C.H.J.M. Fransen (2011). Carideorum Catalogus: The recent species of the Dendrobranchiate, Procarididean and Caridean Shrimps (Crustacea: Decapoda). *Zoologische Mededelingen (Leiden)* 85: 195–588.
- de Man, J.G. (1887). Report on the Podophthalmous Crustacea of the Mergui Archipelago, collected for the Trustees of the Indian Museum, Calcutta, by Dr. John Anderson, FRS, Superintendent of the Museum.—Part II. *Zoological Journal of the Linnean Society* 22(137): 65–128.
- de Man, J.G. (1888). Bericht über die von Herrn Dr. J. Brock im indischen Archipel gesammelten Decapoden und Stomatopoden. *Archiv Fur Naturgeschichte* 53: pls-7.
- Forskål, P. (1775). Descriptiones Animalium, Avium, Amphibiorum, Piscium, Insectorum, Vermium; quae in Itinere Orientali Observavit Petrus Forskål. Post Mortem Auctoris editit Carsten Niebuhr. Adjuncta est materia Medica Kahirina. Mölleri, Hafniae, 19+xxxiv+164 pp.
- Fujino, T. (1975). Fine features of the dactylus of the ambulatory pereopods in a bivalve-associated shrimp, *Anchistus miersi* (De Man), under the scanning electron microscope (Decapoda, Natantia, Pontoniinae). *Crustaceana* 29(3): 252–254.
- Holthuis, L.B. (1952). The Decapoda of the Siboga Expedition, XI. The Palaemonidae collected by the Siboga and Snellius Expedition with remarks on other species. II. Subfamily Pontoniinae. *Siboga Expeditie, Monographic*
- Jayachandran, K.V. (2001). *Palaemonid prawns: biodiversity, taxonomy, biology and management*. (No. Sirsi) i9781578081820, New Delhi, 564 pp.
- Johnson, D.S. & M. Liang (1966). On the biology of the Watchman prawn, *Anchistus custos* (Crustacea: Decapoda: Palaemonidae), an Indo-West Pacific commensal of the bivalve *Pinna*. *Journal of Zoology* 150(4): 433–435.
- Kemp, S. (1922). Notes on Crustacea Decapoda in the Indian Museum. XV. Pontoniinae. *Records of the Indian Museum* 24: 113–288.
- Kemp, S. (1925). Notes on crustacea decapoda in the Indian Museum. XVII. On various caridea. *Records of the Zoological Survey of India* 27(4): 249–343.
- Latreille, P.A. (1802). Histoire naturelle générale et particulière des crustacés et des insectes: ouvrage faisant suite aux Oeuvres de Leclerc de Buffon, et partie du Cours complet d'histoire naturelle rédigé par CS Sonnini Vol. 73. de l.
- Madhavan, M., P. Purushothaman, S. Akash, S. Bharathi, S. Jose, A. Dhinakaran, T.T.A. Kumar & K.K. Lal (2019). New record of Thor hainanensis Xu & Li, 2014 and taxonomical remarks on *Lysmata ternatensis* de Man, 1902 (Decapoda: Thoridae & Lysmatidae) from the Lakshadweep Islands, India. *Zootaxa* 4624(3): 351–364. <https://doi.org/10.11646/zootaxa.4624.3.4>
- Monod, T. (1976). Sur quelques natantia (crust. Decapodes) de noumea (nouvelle-caledonie). *Cahiers du Pacifique* 19: 7–28.
- Neo, M.L., B.Y. Lee, K. Vicentuan & P.A. Todd (2015). Dichromatism in the commensal shrimp *Anchistus miersi* (De Man, 1888). *Marine Biodiversity* 45(4): 877–878.
- Prakash, S. & N. Marimuthu (2020). Notes on some crinoid associated decapod crustaceans (Crustacea: Decapoda) of Lakshadweep Archipelago, Central Indian Ocean. *Zootaxa* 4766(1): 86–100.
- Rafinesque, C.S. (1815). *Analyse de la nature, ou tableau de l'univers et des corps organisés*. Aux dépens de l'auteur. 1–224pp.
- Röding, P.F. (1798). Museum Boltienianum sive Catalogus cimeliorum e tribus regnis naturæ quæ olim collegerat Joa. Fried Boltien, M. D. p. d. per XL. annos proto physicus Hamburgensis. Pars secunda continens Conchylia sive Testacea univalvia, bivalvia & multivalvia. Trapp, Hamburg. viii, 199 pp.
- Samuel, V.K.D., C.R. Sreeraj, P. Krishnan, C. Parthiban, V. Sekar, K. Chamundeeswari, T. Immanuel, P. Shesdev, R. Purvaja & R. Ramesh (2016). An updated checklist of shrimps on the Indian coast. *Journal of Threatened Taxa* 8(7): 8977–8988. <https://doi.org/10.11609/jott.2628.8.7.8977-8988>



Dr. Ian J. Kitching, Natural History Museum, Cromwell Road, UK
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, 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, Araboo, 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. P.A. Azeez, Coimbatore, Tamil Nadu, India

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 2020–2022

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.

Print copies of the Journal are available at cost. Write to:
The Managing Editor, JoTT,
c/o Wildlife Information Liaison Development Society,
43/2 Varadarajulu Nagar, 5th Street West, Ganapathy, Coimbatore,
Tamil Nadu 641006, India
ravi@threatenedtaxa.org

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



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)

April 2023 | Vol. 15 | No. 4 | Pages: 22927–23138

Date of Publication: 26 April 2023 (Online & Print)

DOI: 10.11609/jott.2023.15.4.22927-23138

www.threatenedtaxa.org

Articles

Inventory and abundance of non-volant mammals and birds in the unprotected regions of the Mount Apo Range, Philippines

– Jhonnell P. Villegas, Jireh R. Rosales, Giovanna G. Tampus & Jayson C. Ibañez, Pp. 22927–22939

Floral biology of *Baccaurea courtallensis* – an endemic tree species from peninsular India

– Karupiah Nandhini, Vincent Joshuva David, Venugopal Manimekalai & Perumal Ravichandran, Pp. 22940–22954

Plant species diversity in the riparian forests of the Moyar River in southern India

– Muthu Karthick Nagarajan & Avantika Bhaskar, Pp. 22955–22967

Diversity of bracket fungi (Basidiomycota: Agaricomycetes: Polyporaceae) in Jammu Division, Jammu & Kashmir, India

– Brij Bala, Pp. 22968–22989

Identification, prioritization, and management of biodiversity hot spots: a case study of Western Ghats of Maharashtra, India

– Shivam Trivedi & Erach Bharucha, Pp. 22990–23004

Communications

Mammalian diversity of Debrigarh Wildlife Sanctuary, Odisha, India

– Nimain Charan Palei, Bhakta Padarbinda Rath & Sudeep Nayak, Pp. 23005–23015

Vertebrate road kills on State Highway 26 in Khandwa Forest Division, central India

– Kamran Husain & Prachi Mehta, Pp. 23016–23028

Terrestrial vertebrate and butterfly diversity of Garbhanga Landscape, Assam, India

– Pranjal Mahananda, Shah Nawaz Jelil, Sanath Chandra Bohra, Nilutpal Mahanta, Rohini Ballave Saikia & Jayaditya Purkayastha, Pp. 23029–23046

The avian diversity of Chemmattamvayal Wetlands and adjacent areas of Kasaragod District, Kerala, India

– Sreehari K. Mohan, R. Anjitha & K. Maxim Rodrigues, Pp. 23047–23060

Westward range extension of Burmese Python *Python bivittatus* in and around the Ganga Basin, India: a response to changing climatic factors

– Pichaimuthu Gangaiamaran, Aftab Alam Usmani, C.S. Vishnu, Ruchi Badola & Syed Ainul Hussain, Pp. 23061–23074

First record of *Tanaorhinus viridiluteata* Walker, 1861 (Lepidoptera: Geometridae: Geometrinae) from Mizoram, India

– B. Lalnghahpuii, Lalruatthara & Esther Lalhmingliani, Pp. 23075–23082

The giant clam commensal shrimp *Anchistus miersi* (de Man, 1888) (Decapoda: Palaemonoidae) new to Lakshadweep Sea, India

– Manu Madhavan, Purushothaman Paramasivam, S. Akash, T.T. Ajith Kumar & Kuldeep Kumar Lal, Pp. 23083–23090

Earthworm (Annelida: Clitellata) fauna of Chhattisgarh, India

– M. Nurul Hasan, Shakoor Ahmed, Kaushik Deuti & Nithyanandam Marimuthu, Pp. 23091–23100

Recent Foraminifera from the coast of Mumbai, India: distribution and ecology

– Ganapati Ramesh Naik, Manisha Nitin Kulkarni & Madhavi Manohar Indap, Pp. 23101–23113

Short Communications

Additional breeding records of Hanuman Plover *Charadrius seebohmii* E. Hartert & A.C. Jackson, 1915 (Aves: Charadriiformes: Charadriidae) from southeastern coast of India

– H. Byju, N. Raveendran, S. Ravichandran & R. Kishore, Pp. 23114–23118

A study on the breeding habits of Red-wattled Lapwing *Vanellus indicus* Boddaert, 1783 (Aves: Charadriiformes: Charadriidae) in the agricultural landscape of Muzaffarnagar District, Uttar Pradesh, India

– Ashish Kumar Arya, Kamal Kant Joshi, Deepak Kumar & Archana Bachheti, Pp. 23119–23122

Rediscovery and redescription of *Urolabida nilgirica* Yang (Hemiptera: Heteroptera: Urostylidae) from India

– Pratik Pansare, H. Sankararaman & Hemant V. Ghate, Pp. 23123–23130

The perception of bee and wasp fauna (Hymenoptera: Aculeata) by the inhabitants of Mangdi Valley, central Bhutan

– Kinley Tenzin, Pp. 23131–23135

Note

Breeding record of Little Ringed Plover *Charadrius dubius jerdoni* Legge, 1880 (Charadriidae: Charadriiformes) from Tamil Nadu, India

– H. Byju, Yoganathan Natarajan, N. Raveendran & R. Kishore, Pp. 23136–23138

Publisher & Host

