

Building evidence for conservation globally

Journal of Threatened Taxa

10.11609/jott.2023.15.11.24151-24290
www.threatenedtaxa.org

26 November 2023 (Online & Print)
15(11): 24151-24290
ISSN 0974-7907 (Online)
ISSN 0974-7893 (Print)



Open Access



Bhama..



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, 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

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

Dr. Kiran Ramchandra Ranadive, Annasaheb Magar Mahavidyalaya, Maharashtra, 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 Baños, 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. Warriar, 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

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: Leaves and fruits of *Terminalia arjuna* in water colour artwork on cold pressed water colour paper by Bhama Sridharan.



OPEN
ACCESS

SHORT COMMUNICATION

Chemical immobilisation of free ranging Tibetan Wolf *Canis lupus chanco* (Gray, 1863) (Mammalia: Carnivora: Canidae) with Ketamine-Xylazine combination in Ladakh, India

Animesh Talukdar¹ & Pankaj Raina²

^{1,2} Wildlife Rescue and Rehabilitation Centre- Leh- Under Department of Wildlife Protection- Ladakh, Badamibagh, Skara, Leh, UT-Ladakh 194101, India.

¹animeshtalukdar@rediffmail.com (corresponding author), ²pankaj.acf@live.com

Abstract: The Tibetan Wolf *Canis lupus chanco* is one of the two Critically Endangered species of Ladakh, India. Six free-ranging Tibetan wolves were immobilized using ketamine and xylazine mixture as part of the rescue operations. Dose rates of 4.92 ± 0.52 mg/kg body weight and 2.08 ± 0.29 mg/kg body weight for ketamine and xylazine respectively provided good level of anesthesia for carrying out effective capture. Drug induction was recorded at 4.4 ± 1.1 minutes with animal coming into sternal recumbency by 5.6 ± 1.5 minutes and animals were approached at 6.2 ± 1.7 minutes. Duration of anesthesia was 35.25 ± 6.07 minutes. Yohimbine administered for reversal at the dosage of 0.125 mg/kg body weight provided reversal effect with animal standing by 15.5 ± 4.2 minutes. The current information suggests that xylazine and ketamine mixture is effective and safe for capturing the free-ranging Tibetan Wolves for wildlife management interventions.

Keywords: Chemical capture, immobilization, induction, rescue, reversal, revival.

The Tibetan Wolf *Canis lupus chanco* is the largest canid species in India with high conservation priority (Shawl et al. 2008). In India, it is recorded from parts of Kashmir, Changthang plateau of Ladakh and Spiti valley of Himachal Pradesh at elevation range of 3,200–5,600 m (Khan et al. 2023). In Ladakh region, Tibetan Wolf is found in both Leh and Kargil districts and is listed as ‘Critically Endangered’ species as per the IUCN Red List.

Tibetan wolf is protected and included in the Schedule I of India’s Wildlife (Protection) Act, 1972 (Shawl et al. 2008). The ambient temperature in the area ranges from -5 to -10°C.

Wild animal rescues involving animal capture is an important wildlife management technique for managing wild animals in distress with conservation implications as it supports management of conflict situations (Nyhus 2016). Chemical immobilization is a safe and effective strategy for capturing wildlife as it causes minimal stress to wild animals (Nielsen 1999). Limited reports are available on anesthetic doses for most of the wild species in India for effective immobilization (Belsare & Vanak 2013).

Ketamine-xylazine drug mixture has been effectively used for immobilization of wild canids (Muliya et al. 2016). We report successful chemical immobilisation of free-ranging Tibetan Wolf *Canis lupus chanco* with ketamine-xylazine combination.

Methods

Ladakh is located between Longitudes of 32.25° to 34.63° N and latitudes of 75.6° to 78.36° E at the western

Editor: Bahar Baviskar, Wild-CER, Nagpur, India.

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

Citation: Talukdar, A. & P. Raina (2023). Chemical immobilisation of free ranging Tibetan Wolf *Canis lupus chanco* (Gray, 1863) (Mammalia: Carnivora: Canidae) with Ketamine-Xylazine combination in Ladakh, India. *Journal of Threatened Taxa* 15(11): 24277–24279. <https://doi.org/10.11609/jott.8502.15.11.24277-24279>

Copyright: © Talukdar & Raina 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: Department of Wildlife Protection, UT-Ladakh.

Competing interests: The authors declare no competing interests.

Acknowledgements: The authors are grateful to the chief wildlife warden, Department of Wildlife Protection, Ladakh for the necessary permission to carry out these rescue operations. We specially thank Parvez Ahmad, Kartik Thevar, Gulam Rasool, Nawang Thinles, & Sonam Nurbu for their help in executing the rescue and release operations of the Tibetan wolves. We also thank local people of Ladakh for their help and support for the rescue operations. We are grateful to Dimpri A. Patel for her valuable comments on earlier drafts of this manuscript. We also express our gratitude to the reviewers for their valuable insights and contributions.

part of India and falls under Trans-Himalayan region. The altitudinal range of 2,700–7,500 m and total area of Ladakh is 78,000 km². It has two districts — Leh and Kargil. Six Tibetan Wolves (one female and five males) were captured from different parts of Leh district of Ladakh as part of the field rescue operations carried by the Wildlife Protection Department, Leh, Union territory of Ladakh. All the animals in this study were captured either due to displacement or distress.

All the animals were chemically immobilised using a combination of xylazine hydrochloride (2 mg/kg) (XYLAMED, 100 mg/ml, Bimeda, Cambridge, Ontario) and ketamine hydrochloride (5 mg/kg) (KETAMINA, 100 mg/ml, Biowet Pulawy, Poland or VETALAR, 100 mg/ml, Parke Davis & Co., P O Box qq8 GPO, Detroit, Michigan 48232, USA). The drug mixture was administered remotely using air pressurised syringe projector (Dan Inject model-JM Syringe projector). Following completion of necessary procedures, yohimbine (0.125 mg/kg) (20 mg/ml; YOHIMBE, 20 ml, Equimed USA) was administered intramuscularly for drug reversal.

RESULTS

All the animals were weighed for accurate body weights after induction and drug dosages were calculated retrospectively. Actual body weight, drug dosage, induction (first sign of induction), time of complete loss of consciousness and total duration required for carrying out field procedures was recorded. Initial signs of drug effect included decreased mentation and progressive ataxia followed by recumbency. Drug induction was rapid and smooth in all the animals. The mean ± standard deviation for actual body weight, actual dose rate of ketamine, actual dose rate of xylazine, induction, approach time, total time for carrying out field procedures were 29.22 ± 5.31 kg, 4.92 ± 0.52

mg/kg, 2.08 ± 0.29 mg/kg, 4.1±1.1 minutes, 5.6 ± 1.5 minutes, and 35.25 ± 6.07 minutes, respectively. All the physiological parameters remained well within the normal range for other canid species during the entire procedure (Malmsten 2007) with no adverse effect observed from any of the animal captured (Table 1).

Following completion of field procedures, the animals were administered yohimbine (0.125 mg/kg) and the sequence of recovery events were recorded. Different parameters recorded for signs of recovery were ear and eye movement time, head raising time and standing time after reversal. The mean ± standard deviation for ear and eye movement time, head raising time and standing time after reversal were 11.75 ± 2.6 minutes, 13.25 ± 2.87 minutes and 15.5 ± 4.2 minutes, respectively.

None of the cases showed any signs of extrapyramidal signs and all the recoveries were smooth.

DISCUSSION

Since there are limited studies on immobilisation of Tibetan Wolf, its immobilisation is a challenge when there is requirement for such intervention. The combination of ketamine hydrochloride and xylazine hydrochloride (4.92 ± 0.52 mg/kg body weight and 2.08 ± 0.29 mg/kg body weight, respectively) was found to be effective for chemical capture of Tibetan wolf in field emergencies. However, Chakraborty & Das (1994) documented use of 10 mg/kg of ketamine and 1.33 mg/kg of xylazine mixture to be effective for immobilisation of Tibetan Wolf in captivity. The dose rate of xylazine and ketamine in the present study are like those documented by Miller & Fowler (2014) for Gray Wolves.

Since there is a lack of existing information on the physiological parameters of Tibetan Wolves, we were unable to make direct comparisons with our results.

Table 1. Mean ±SD and range for physiological parameters observed in Tibetan Wolf *Canis lupus chanco* chemically immobilized with ketamine and xylazine drug combination.

Parameters	Unit	Mean ± SD	Range
Rectal temperature on approach	°F	102.28 ± 0.82	101–103
Rectal temperature after 10 minutes of approach	°F	102 ± 0.4	101.5–102.5
Rectal temperature after 20 minutes of approach	°F	102 ± 0.5	101.5–102.5
Respiration rate on approach	/Minute	19.6 ± 7.3	12–19
Respiration rate after 10 minutes of approach	/Minute	20.2 ± 5.76	12–30
Respiration rate after 20 minutes of approach	/Minute	17.25 ± 4.99	14–26
Heart rate on approach	/Minute	66.25 ± 10.9	58–82
Heart rate after 10 minutes of approach	/Minute	76 ± 16.57	62–100
Heart rate after 20 minutes of approach	/Minute	73 ± 10.39	64–82

Nevertheless, the recorded rectal temperatures throughout the entire procedure were found to be within the normal range observed (Malmsten 2007) though the respiratory rate (12–19 per minute) and heart rate (69–98 per minute) was higher compared to values of Indian Gray Wolf as reported by Muliya et al. (2016).

CONCLUSION

We conclude that the ketamine and xylazine anesthesia @ 4.92 ± 0.52 mg/kg, 2.08 ± 0.29 mg/kg, respectively was effective for immobilization of Tibetan Wolves and yohimbine @ 0.125 mg/kg act as excellent reversal drug against xylazine. The drug combinations used in the study has been referenced for free ranging Tibetan Wolves and their physiological parameters, which can help in managing emergency rescue situations for free ranging Tibetan Wolves. The study was based on smaller sample size. A larger sample size would be advantageous to make the results more rigorous and insightful.

REFERENCES

- Belsare, A.V. & A.T. Vanak (2013).** Use of xylazine hydrochloride–ketamine hydrochloride for immobilization of Indian Fox (*Vulpes bengalensis*) in field situations. *Journal of Zoo and Wildlife Medicine* 44(3): 753–755. <https://doi.org/10.1638/2012-0158R.1>
- Chakraborty, G. & A. Das (1994).** Xylazine-ketamine anesthesia in a Tibetan Wolf (*Canis-lupus chanco*). *Indian Veterinary Journal* 71(10): 1047–1047.
- Khan, N.H., B. Pandav & A. Ghosal (2023).** *Mammals of Ladakh- A Pocket Guide*. Bombay Natural History Society, Mumbai, 60 pp.
- Malmsten, J. (2007).** Blood pressure in free-ranging Gray Wolves (*Canis lupus*) immobilized with tiletamine and zolazepam. Dissertation. Swedish University of Agricultural Sciences.
- Miller, E.R. & M.E. Fowler (eds.) (2014).** *Fowler's Zoo and Wild Animal Medicine, Volume 8*. Elsevier Health Sciences, St. Louis, Missouri, 792 pp.
- Muliya, S.K., A.A. Shanmugam, P. Kalaigan, L. Antony, H. Chandranpillai & N. Jaisingh (2016).** Chemical immobilisation of dhole (*Cuon alpinus*), Indian jackal (*Canis aureus indicus*) and Indian wolf (*Canis lupus pallipes*) with ketamine hydrochloride–xylazine hydrochloride. *Veterinary Medicine and Science* 2(3): 221–225. <https://doi.org/10.1002/vms3.35>
- Neilsen, L. (1999).** *Chemical immobilization of wild and exotic animals*. Iowa State University Press, Ames, Iowa, 341 pp.
- Nyhus, P. J. (2016).** Human–wildlife conflict and coexistence. *Annual review of environment and resources* 41: 143–171. <https://doi.org/10.1146/annurev-environ-110615-085634>
- Shaw, T., J. Takpa, P. Tashi & Y. Panchaksharam (2008).** *Field Guide Mammals of Ladakh*. WWF, New Delhi, India, 114 pp.



Mr. Jatishwor Singh Irungbam, Biology Centre CAS, Branišovská, Czech Republic.
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. Chandrashekhar U. Rivonker, Goa University, Taleigão Plateau, Goa, India
Dr. S.R. Ganesh, Chennai Snake Park, Chennai, Tamil Nadu, India
Dr. Himansu Sekhar Das, Terrestrial & Marine Biodiversity, Abu Dhabi, UAE

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

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 Sundev, 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, 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 2020–2022

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.

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



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)

November 2023 | Vol. 15 | No. 11 | Pages: 24151–24290

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

DOI: 10.11609/jott.2023.15.11.24151-24290

Articles

Social structure and ecological correlates of Indian Blackbuck *Antelope cervicapra* (Linnaeus, 1758) (Mammalia: Artiodactyla: Bovidae) sociality at Point Calimere Wildlife Sanctuary, India

– Subhasish Arandhara, Selvaraj Sathishkumar, Sourav Gupta & Nagarajan Baskaran, Pp. 24151–24168

Diversity and distribution of birds in the Bharathapuzha River Basin, Kerala, India

– P.N. Anoop Raj, A.D. Velankar & P. Pramod, Pp. 24169–24183

A review of the status of vultures in the southern state of Karnataka, India

– Gopal Praphul & Honnavalli N. Kumara, Pp. 24184–24200

Spatial, temporal and trophic resource partitioning among the four egret species (Aves: Pelecaniformes: Ardeidae) in a tropical wetland ecosystem, India

– Faiza Abbasi & Mohd Shahnawaz Khan, Pp. 24201–24211

Larval descriptions and oral ultrastructures of some anurans (*Duttaphrynus*, *Minervarya*, *Nyctibatrachus*, *Rhacophorus*, & *Polypedates*) (Amphibia) from Wayanad and Vagamon hills, Western Ghats, India

– Prudhvi Raj, Pp. 24212–24240

Flies in the high for floral hike? Altitudinal variation in species diversity and composition of Diptera (Insecta) in the eastern Himalaya, India

– Shuvra Kanti Sinha, Santanu Mahato, Pravas Hazari, Sarmistha Ojha, Nandan Jana, Niyatee Pandya, Amita Hajra, Ujjal Ghosh & Silanjan Bhattacharyya, Pp. 24241–24254

Communications

Body growth and condition of endangered *Tor putitora* (Hamilton, 1822) (Actinopterygii: Cypriniformes: Cyprinidae) in the crucially important breeding and nursery grounds of the Ganga stock

– Priyanka Rana & Prakash Nautiyal, Pp. 24255–24260

The arboreal microsnail *Insulipupa malayana* (Issel, 1874) (Gastropoda: Stylommatophora: Vertiginidae) from West Bengal, India

– Himangshu Barman, Pranesh Paul & Gautam Aditya, Pp. 24261–24265

Mapping invasive alien plants through citizen science: shortlisting species of concern for the Nilgiris

– Shiny Mariam Rehel, R.S. Reshnu Raj, Samuel Thomas, Milind Bunyan, Anita Varghese & Ankila J. Hiremath, Pp. 24266–24276

Short Communications

Chemical immobilisation of free ranging Tibetan Wolf *Canis lupus chanco* (Gray, 1863) (Mammalia: Carnivora: Canidae) with Ketamine-Xylazine combination in Ladakh, India

– Animesh Talukdar & Pankaj Raina, Pp. 24277–24279

A preliminary observation on the nesting of the Indochinese Roller *Coracias affinis* Horsfield, 1840 (Aves: Coraciiformes: Coraciidae) in Assam and northern West Bengal, India

– Sachin Ranade, Jay Gore & Sonali Ranade, Pp. 24280–24283

Notes

First photographic record of Hoary-bellied Squirrel *Callosciurus pygerythrus* (I. Geoffroy Saint Hilaire, 1832) (Mammalia: Rodentia: Sciuridae) from Banke National Park, Nepal

– Yam Bahadur Rawat, Shyam Kumar Shah, Sunjeep Pun & Dristee Chad, Pp. 24284–24287

***Cyperus babakan* Steud. (Liliopsida: Poales: Cyperaceae), a new record for southern India**

– B.S. Anakha & A.R. Viji, Pp. 24288–24290

Publisher & Host

