

Building evidence for conservation globally

Journal of Threatened TAXA

10.11609/jott.2023.15.6.23283-23462

www.threatenedtaxa.org

26 June 2023 (Online & Print)

15(6): 23283-23462

ISSN 0974-7907 (Online)

ISSN 0974-7893 (Print)



Open Access





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, FNAPsyRamanna 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, Mavinahalli PO, Nilgiris, Tamil Nadu 643223, India

Dr. Martin FisherSenior 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, Kuvenpu University, Shimoga, Karnataka, India
Dr. K.R. Sridhar, Mangalore University, Mangalagangotri, 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. Manda 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. Nobile, 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. Warrier, 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. Jatishwar Singh Irungbam, Biology Centre CAS, Branišovská, Czech Republic.

For Focus, Scope, Aims, and Policies, visit https://threatenedtaxa.org/index.php/JoTT/aims_scopeFor 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: Marine invertebrates - made with acrylic paint. © P. Kritika.



Rayed Thistle Fly *Tephritis cometa* Loew (Diptera: Tephritidae) a new record to India

Rayees Ahmad¹ , Tariq Ahmad²  & Barkat Hussain³ 

^{1,2} Entomology Research Laboratory, Department of Zoology, University of Kashmir, Srinagar, Jammu & Kashmir 190006, India.

³ Division of Entomology, Faculty of Horticulture, Sher-e-Kashmir University of Agriculture Science & Technology- Kashmir, Jammu & Kashmir 190025, India.

¹ bhatrayees10@gmail.com, ² drtariqento@kashmiruniversity.ac.in, ³ bhatbari@rediffmail.com (corresponding author)

Abstract: *Tephritis cometa* Loew, 1840, known to infest field thistle or Canada thistle or creeping thistle *Cirsium arvense*, a medicinal plant used as a tonic and to treat disease such as diarrhea and tuberculosis; it is diuretic. *Cirsium arvense* is a perennial flowering plant belonging to the family Asteraceae and is native to Europe, northern Africa, and western Asia. We report the first record of *Tephritis cometa* Loew, 1840 in southern Asia from Kashmir, India. The identified specimen of *Tephritis cometa*, commonly known as Rayed Thistle Fly was found on *Cirsium arvense*, a grass (Asteraceae) at the site, SKU2 in district Kulgam. However, the actual host plant is unknown. This paper includes morphological studies, key identification, diagnosis, and its distribution.

Keywords: Kulgam, methyl eugenol, yellow simple bottle trap, southern Asia.

Urdu:

تھریس کوئتا لوی 1890، ایک ایسا کیڑا ہے جو کہ کنیڑا تھسل با کریبینگ تھسل، سرسیم اروئیں بودے پے بینتھ کر اس پے انٹے ہے۔ بھر پھر انٹے لاروے میں تبدیل ہوئے ہے اور اس بودے کو کلپاڑا ہے۔ سرسیم اروئیں بہت ہے مفید بودا ہے جو انسان کی سخت کیلے بہت کاگر ٹابت ہے۔ یہ ایک ایسا بودا ہے جو کہ بہت ساری بیماریوں جیسے دست، تپ دق اور پیشہ اس کی بیماری کیلے علاج ہوتا ہے۔ یہ بودا ایسٹریسی فیہلی سے واسستہ ہے جس میں بہول کھلنا رہتا ہے اور یہ بورب، شمالی افریقہ اور مغربی ایشیا میں بینیادی طور پر پایا جاتا ہے۔ تھریس کوئتا لوی 1890، کو مم کے بھلی بار جنوبی ایشیا کے کشمیر اور کنگریزیہ ایشیا کے ایک ظالع کلگام کے سایت اپنے کے بو 2 میں دریافت کیا ہے۔ دراصل کشمیر میں یہ کس پوچھے ہے اینا گزر پس کرکت ہے یہ اپنی بم نوی جان پاے۔ اس پیپر میں اس کیڑے کی بینیادی بہجان، پیروی جسم کے بارے میں اطلاعات اور کہاں کہاں پایا جاتا ہے۔ سب شامل ہے۔ اشارتی الفاظ: کلگام، میتھا عیل اوجیتاں، زرد رنگ کے بوتل والے تراپ، جنوبی ایشیا

Editor: R.M. Sharma, Zoological Survey of India, Pune, India.

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

Citation: Ahmad, R., T. Ahmad & B. Hussain (2023). Rayed Thistle Fly *Tephritis cometa* Loew (Diptera: Tephritidae) a new record to India. *Journal of Threatened Taxa* 15(6): 23344-23349. <https://doi.org/10.11609/jott.8071.15.6.23344-23349>

Copyright: © Ahmad 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: This research received no external funding from any funding agency.

Competing interests: The authors declare no competing interests.

Author details: RAYEES AHMAD is a research scholar at Department of Zoology, University of Kashmir, working on fruit flies and their sustainable management with Pheromone Application Technology (PAT) and Sterile Insect Technique (SIT). TARIQ AHMAD is a professor at Department of Zoology, University of Kashmir, working on the alien flora of Kashmir and their management using native insect herbivores. BARKAT HUSSAIN is a professor cum chief scientist at Division of Entomology, Sher-e-Kashmir University of Agricultural Sciences and Technology of Kashmir, working on Pheromone Application Technology.

Author contributions: Conceptualization, RA, BH, & TA; methodology, BH, RA, & TA; formal analysis, RA; field survey, RA; data curation, RA; writing-original draft preparation, RA; All authors have visualized and reviewed the manuscript.

Acknowledgements: The authors are very much thankful to Head, Department of Zoology, University of Kashmir- Srinagar, for providing lab facilities as well as necessary equipment's during our study. Authors also thanks Professor Richard (Dick) A.I. Drew, Director, International Centre for management of Pest Fruit Flies, Griffith University, Nathan, Queensland, Australia and David Hancock, South Street, Carlisle, Cumbria CA1 2EP, United Kingdom for identification of the fruit fly. Sareer Ahmad, Research Scholar at Earth Sciences Department, University of Kashmir is also acknowledged for his help in the creation of study area map.



INTRODUCTION

There are roughly 4,500 species of true fruit flies (Diptera: Tephritidae), and about 100 of them are pests of commercially farmed fruits (Norrbom et al. 1999; Korneyev & Dilberk 2000). Tephritids are known to traverse enormous distances and are invasive in all continents (Duyck et al. 2004). These notorious insects are phytophagous, and some of them can be harmful pests or employed as weed-controlling bioagents (White & Elson-Harris 1992). The majority of them are members of a few sizable genera, such as *Bactrocera* and *Dacus*, which are widespread throughout zoogeographic regions.

Tephritis Latreille is the third largest genus in the Tephritinae and the sixth largest genus in the Tephritidae with roughly 170 species (Norrbom et al. 1999; Korneyev & Dirlbek 2000). The majority of *Tephritis* species consume various species of the same genus and are commonly referred to as stenophagous or monophagous (Korneyev 2016). Some characteristic features such as two dark frontal setae; dorso-central setae located on or just posterior to transverse suture; two orbital setae, anterior setae acuminate and dark (brown or blackish), posterior setae typically lanceolate and pale (whitish or yellowish; in 2 species brown or black); flat scutellum with two sets of setae, with apical setae that are 0.5–0.6 times longer than basal setae; wing pattern varies greatly between species, typically reticulate with a well-developed apical fork, but can also be stellate or even banded (Freidberg & Kugler 1989; Merz 1994) set *Tephritis* apart from the other genera in the subfamily Tephritinae.

Korneyev (2013), described eleven species of the genus *Tephritis*, mostly from the Palaearctic Middle East, with an unusual banded wing pattern with four new records: *Tephritis afrostriata*, *T. cameo*, *T. gladius*, and *T. ochroptera*. Korneyev & Evstigneev (2019), redescribed six species from western Palaearctic region in which *T. conura* (Loew, 1844), *T. hendeliana* Hering, 1944, and *T. hyoscyami* (Linnaeus, 1758) are from Europe, *T. anthrax* Korneyev & Evstigneev, 2019 from Caucasian and Transcaucasia mountains, while other two, *T. cardialis* Hardy, 1974 and *T. atokoptera* Agarwal & Kapoor, 1988, from Pakistan and India, respectively. Among the nine species of Tephritidae that are recorded for the first time from Transcaucasia are two new species, *T. oedipus* Hendel, 1927 and *T. hendeliana* Hering, 1944 (Evstigneev & Glukhova 2022).

T. cometa Loew, (1840), belongs to the tribe Tephritini, family Tephritidae and has been identified

as a frequent pest of *Cirsium arvense*, *C. vulgare*, and *C. lappaceum*. Typically, the larvae of *T. cometa* eat the flowers of *Cirsium* species, while some species induce the formation of galls in roots or stems of Asteraceae (Freidberg 1984; Merz 1994). The records of *T. cometa* for the first time were reported from Flanders and Belgium (Nobby 2001), Foum El Gherza Dam, a wet land habitat in Biskar region (Deghivhe-Diab et al. 2021), Iran (Namin et al. 2010), Turkey (Kutuk 2006; Kutuk & Katrancı 2021), and Europe, Israel, Afghanistan, Kazakhstan, Mongolia, & China (Norrbom et al. 1999).

India is located at the intersection of the Afro-tropical, Indo-Malayan, and Paleo-Arctic realms and, therefore, possesses characteristic elements from all three. The combination of these three diverse realms gives the nation a rich and distinctive biological variety, due to which, India is one among world's 12 mega-diverse nations (Sinha et al. 2010). The Kashmir Himalaya is a part of the Himalayan biodiversity hotspot that has a serious threat of invasion by foreign insect species. Despite harmful impacts of these insect species on native biodiversity and economic and ecological systems of the region, a field-based intensive sampling study for management of fruit fly with pheromone application technology (PAT) is lacking, which merits urgent research attention. Therefore, it is necessary to recognise the fruit flies that can severely harm a variety of horticultural, agricultural and other plant species. Furthermore, the majority of *Tephritis* species infest the flowerheads and, in certain cases, the stems of Asteraceae hosts, which may lead to the development of galls (Freidberg 1984). As a result, our objective is to investigate pheromone application technology for the management of all known and undiscovered fruit flies that have travelled thousands of miles to establish in the Kashmir Himalaya.

MATERIALS AND METHODS

Survey and trap installation

Kashmir, the northernmost geographical region of the Indian subcontinent where apricots are grown on 2,880 ha, cherry on 2,713 ha, plum on 1,427 ha and peach on 714 ha of land (Daily Hindustan Times 5 August 2022). In Kashmir Valley's fruit and vegetable production zones, a total of 30 sites, three from each district, were chosen for survey through 2019–2021 (Image 1). A total of 94 para-pheromone-filled traps were placed over all the selected areas to catch fruit flies. All the implanted traps were constructed using simple cold drink bottles, which contained methyl eugenol inside hanging rubber

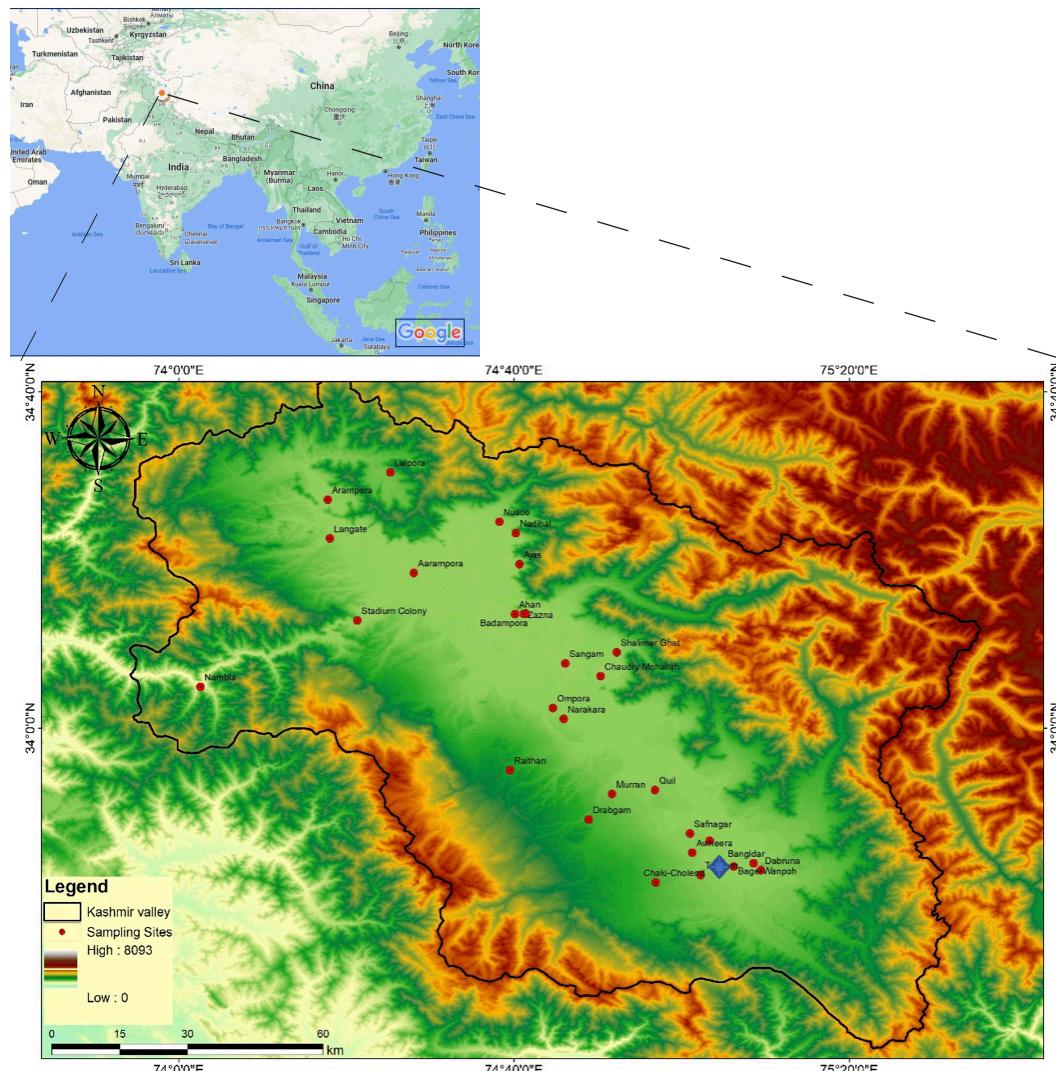


Image 1. Sampling sites selected for the management of tephritis fruit flies in Kashmir, India.

septa and SPLAT at the bottom. Three equally spaced holes, each measuring 1.5 cm², were drilled into the basic bottle trap using a hot T-type handle spanner and a glue gun for the entry of fruit flies.

Collection and identification

All the installed traps were checked and refreshed fortnightly. The voucher specimens were deposited at the Zoology Museum, University of Kashmir. For identification, Hering (1944), Freidberg & Kugler (1989), and Merz (1994) were consulted and further confirmation by Prof. Drew, director, ICMF, Griffith University, Queensland, Australia.

Morphological studies

The present work is totally based on morphological studies following Kutuk (2006), Mohamadzade et

al. (2015), and Gharajedaghi et al. (2011a). Studied morphological characters show differences in wing patterns among different species and are presented in the plate (Image 2). Photographs of wing and habitus were taken using a Leica S9D Stereo zoom microscope at the Entomology Research Laboratory, Department of Zoology, University of Kashmir.

RESULTS

According to the results of our morphological study, *Tephritis cometa* has now crossed into India's territory and may be a severe threat to several grass plants, particularly the country's *Cirsium* spp.

Material examined: 2 male, ZoKU-Art/06209, 14.VIII.2021, Tarigam, Kulgam, Jammu & Kashmir, India,

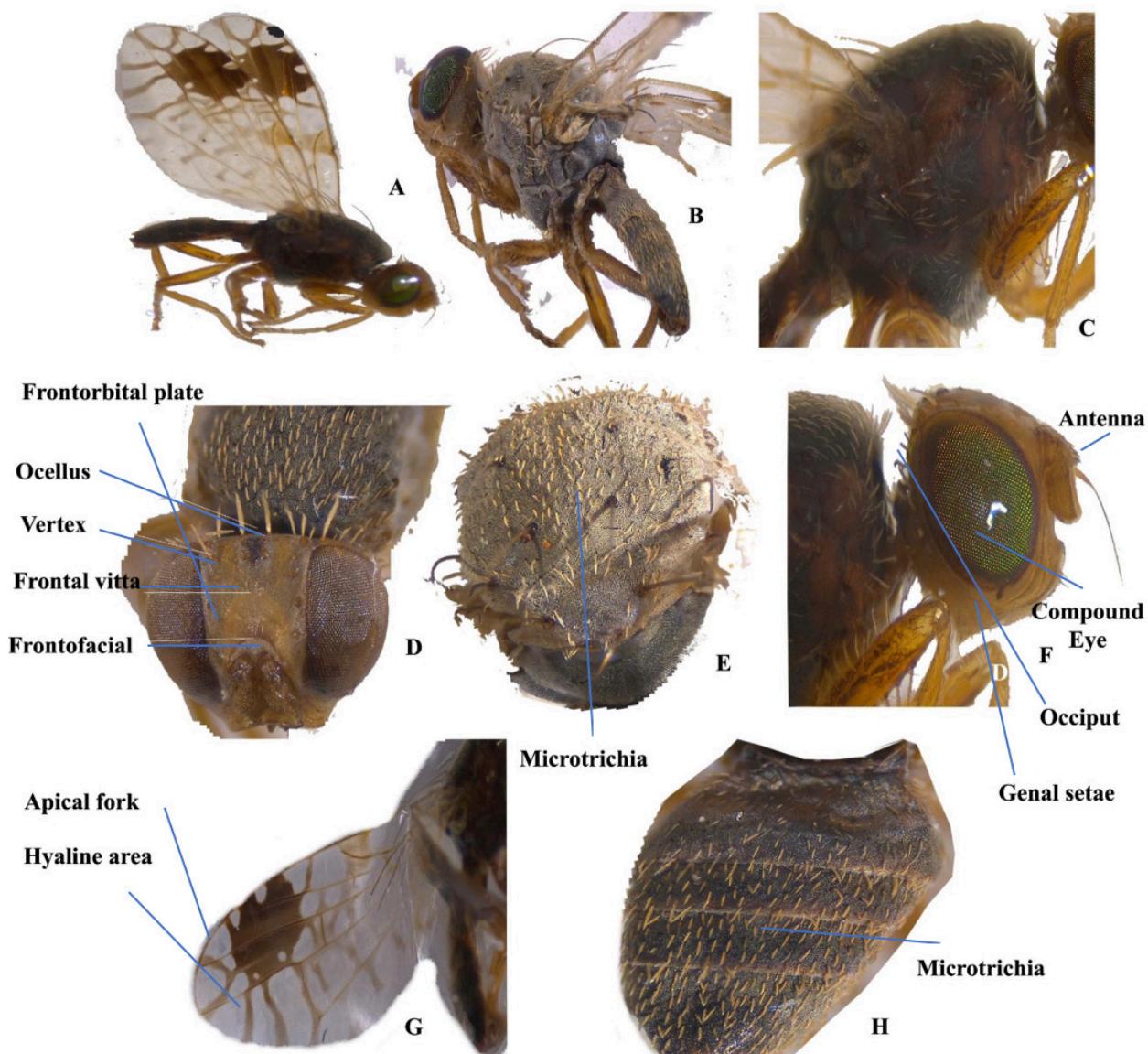


Image 2. *Tephritis cometa*: A—Habitus | B—Lateral habitus | C—Lateral thorax | D—Frontal habitus Ommatidia | E—Dorsal thorax | F—Ommatidia | G—Wing | H—Abdomen. © Rayees Ahmad.

33.7081°N & 75.0380°E, 1,569.14 m, McPhail trap 2, A. Rayees.

Diagnosis: A small fly of about 5–6 mm with distinctively patterned wings. Ocellus with star shaped mark and five ocellar and frontal setae. Frons about 1.8 times as long as eye width, third segment of antenna about 1.7 times as long as wide: apical fork of wing present; branches of apical fork widen distinctly towards wing margin; two or more hyaline areas present in cell m ; basal half of wing mainly hyaline; cell r_1 with small subapical hyaline spot; branches of apical fork uniformly narrow along their entire length; hyaline spot of cell r_{2+3} continuous with basal indentation of cell r_1 (usually 3

hyaline spots), (Image 2). The species is collected along with *Bactrocera* spp. in the MacPhail pheromone trap containing methyl eugenol and SPLAT gel.

Remarks: The genus *Tephritis* has general characteristics making it easily identifiable from other Tephritid fruit flies due to the presence of long and thick inner vertical setae.

Head: The head is predominantly yellow to brown; yellowish on the occiput and ocellar tubercle; brown anterior orbital setae; white postorbital setae; first flagellomere yellow; basal half on arista yellow; palpus mostly yellow, brownish at apex; wide fronto-facial angle.

Table 1. Occurrence of *Tephritis cometa* at SKU site in Kulgam District of southern Kashmir Zone, India.

Zones	Southern Kashmir				Central Kashmir			Northern Kashmir			
	Sites Year	Site SAN	Site SKU	Site SPU	Site SSP	Site CBD	Site CGA	Site CSR	Site NBN	Site NBR	Site NKU
2019	-	-	-	-	-	-	-	-	-	-	-
2020	-	-	-	-	-	-	-	-	-	-	-
2021	-	+	-	-	-	-	-	-	-	-	-
Total Specimens	0	2 males	0	0	0	0	0	0	0	0	0

+-present | --absent | 2—number of specimens trapped.

Thorax: The majority of the setae are brown and acuminate; setulae are numerous usually in pairs on the margin of the scutellum; the basal scutellar seta are longer than the apical scutellar seta; yellow halter; the ground colour is often black; the microtrichia are grey; the scutellum is shiny and silvery.

Legs: Numerous yellow setulae; tarsi usually brown.

Wing: Branches of apical fork widen distinctly towards wing margin; two or more hyaline areas present in cell m ; basal half of wing mainly hyaline; cell r_1 with small subapical hyaline spot; branches of apical fork uniformly narrow along their entire length; hyaline spot of cell r_{2+3} continuous with basal indentation of cell r_1 .

Abdomen: Ground colour usually black; microtrichia numerous and shiny.

Measurements: Body: 5–6 mm; male wing: 4–5 mm.

Habitat: Various habitats such as horticulture and agriculture crop including grassland and areas where Californian Thistle occur (Freidberg 1984; Merz 1994; Deghivhe-Diab et al. 2021).

Distribution: West and Middle Asia, Europe, Israel, Afghanistan, Russia, Kazakhstan, Mongolia, & China (Norrbom et al. 1999), Estonia, Latvia, Lithuania, Ukraine, Moldova, Azerbaijan, Georgia, Armenia, Kazakhstan, Uzbek, Tajikistan, Kirghis, Turkomanas, Switzerland, England, Anglia, Germany, & Turkey (Foote 1984; White 1988; Freidberg & Kugler 1989; Merz 1994; Kutuk & Ozgur 2003; Kutuk 2006), Netherland, France, & Iran (Namin et al. 2010; Gharajedaghi et al. 2011b), Flanders & Belgium (Nobby 2001), and Foum El Gherza Dam, a wet land habitat in Biskar region (Deghivhe-Diab et al. 2021).

Host plants: Numerous authors have described a variety of hosts, including *Circium gaillardotii*, *C. vulgare*, *C. arvense*, and *C. palustre* (White 1988; Freidberg & Kugler 1989; Merz 1994). We caught it at the SKU2 site in the Kulgam district where there were fruits including *Malus domestica* Borkh., *Pyrus* spp. L. and *Prunus persica* L., vegetables- *Cucurbita pepo* L., *Capsicum* sp. L.,

Solanum lycopersicum L., *S. melongena* L., and grasses- *Cirsium arvense* Scop., *Bromus inermis* Leyss., *Cynodon dactylon* L., *Impatiens* sp. L., *Mentha longifolia* L., and *Plantago major* L. were present. However, the actual host is not known here in Kashmir Himalaya.

India status: Reported for the first time in India.

REFERENCES

Agarwal, M.L. & V.C. Kapoor (1988). Four new species of fruit flies (Diptera: Tephritidae: Tephritini) together with a redescription of *Trupanea inaequabilis* Hering and their distribution in India. *Journal of Entomological Research*, 12(2): 117-128.

Deghivhe-Diab, N., L. Degbiche & Y.I. Belhamra (2021). The first record of insect species from wetland ziban Habitat, Biskra (Algeria). *Bulletin of the Natural History Museum, Plovdiv* 6: 47–50.

Duyck, P.F., P. David & S. Quilici (2004). A review of relationships between interspecific competition and invasions in fruit flies (Diptera: Tephritidae). *Ecological Entomology* 29(5): 511–520.

Evtigneev, D. & N. Glukhova (2022). Tephritid flies (Diptera: Tephritidae) of the Caucasus and Transcaucasia: new records and new host plants. *Zoosystematica Rossica* 31(1): 118–129.

Foote, R.H. (1984). Family Tephritidae, In: Soos A. & L. Papp (eds.). Catalogue of Palaearctic Diptera. *Budapest and Elsevier Science Publishers, Amsterdam*, 9: 66–149.

Freidberg, A. (1984). Gall Tephritidae (Diptera), pp. 129–167. In: Ananthakrishnan, T.N. (ed.). Biology of Gall Insects. Oxford and IBH Publishing Co., New Delhi.

Freidberg, A. & J. Kugler (1989). Fauna Palaestina. Insecta IV. Diptera: Tephritidae. Israel Academy of Sciences and Humanities, Jerusalem, 212 pp.

Gharajedaghi, Y., S. Khaghaninia, R.F.P. Abad & E. Zarghani (2011a). Identification of fruit flies of the genus *Tephritis* Latreille, 1804 (Diptera: Tephritidae) in Ajabshir region (Azerbaijan province). *Journal of Plant Protection* 25(3): 325–328.

Gharajedaghi, Y., S. Khaghaninia & S.M. Namin (2011b). Flies of the Tribe Tephritini (Diptera: Tephritidae) Ajabshir Region (East Azerbaijan Province), with new records for Iranian fauna. *Ukrainska Etomofaunistyka* 2(6): 15–18.

Hering, M. (1944). Bestimmungstabelle der Gattung *Tephritis* Latreille, 1804. *SirunaSeva* 5: 17–31.

Korneyev, S.V. (2013). Revision of species of the genus *Tephritis* Latreille 1804 (Diptera: Tephritidae) with entire apical spot. *Zootaxa* 3620: 67–88.

Korneyev, S.V. (2016). On the taxonomic revision of the genus *Tephritis* (Diptera, Tephritidae): new synonymy. *Vestnik Zoologii* 50(1): 31.

Korneyev, S.V. & D. Evtigneev (2019). Review of the Tephritis hyoscyami-conura Group of Species (Diptera: Tephritidae)

with description of a new species. *Annales Zoologici* 69: 719–736.

Korneyev, V.A. & J. Dirlbek (2000). The fruit flies (Diptera: Tephritidae) of Syria, Jordan and Iraq. *Studia Dipterologica* 7: 463–482.

Kutuk, M. (2006). The fauna and systematics of the genus *Tephritis* Latreille, 1804 (Diptera: Tephritidae) with a key to the species of *Tephritis* in Turkey. *Turkish Journal of Zoology* 30: 345–356.

Kutuk, M. & A.F. Ozgur (2003). Faunistical and systematical studies on the genus *Tephritis* Latreille, 1804 (Diptera: Tephritidae) in the South West of Turkey along with new records. *Turkiye Entomoloji Dergisi* 27: 243–252.

Kutuk, M. & U. Katranci (2021). Fruit Fly (Diptera: Tephritidae) Fauna of Ordu (Turkey) Province. *Turkish Journal of Agriculture - Food Science and Technology* 9(6): 1159–1164.

Loew, H. (1840). "Trypeta stigma und Trypeta cometa, zweineue europäische Zweifluglerarten". *Stettiner Entomologische Zeitung*, 1: 156–158.

Merz, B. (1994). Diptera, Tephritidae. *Insecta Helvetica Fauna*, Vol: 10, HE Press, Geneve.

Namin, M.S. & S.V. Korneyev (2015). Revision of Heringina Aczel, 1940 (Diptera: Tephritidae) with description of a new species from Iran and Turkey, *Zootaxa* 3949 (1): 111–122.

Namin, M.S., J. Nozari & G. Rasoulian (2010). The fruit flies (Diptera: Tephritidae) in Tehran province, with new records for Iranian fauna. *Vestnik Zoologii* 44(1): 20–31.

Nobby (2001). *Tephritis cometa* (Diptera: Tephritidae): first record for Flanders and Belgium. *Phagea* 29: 79–80.

Norrbom, A.L., L.E. Carroll, F.C. Thompson, I.M. White & A. Freidberg (1999). Systematic Database of Names. In: Thompson, F.C. (ed.). *Fruit Fly Expert Identification System and Systematic Information Database*. Backhuys Publishers, Myia 9. Leiden.

Sinha, R.K., M. Dubey, R.D. Tripathi, A. Kumar, P. Tripathi & S. Dwivedi (2010). India as a megadiversity nation. *International Society of Environmental Botanists*, 16(4): 1–3.

White, I.M. (1988). Tephritid flies. Diptera: Tephritidae. *Handbooks for the Identification of British Insects X (5a)*, London, 134 pp.

White, I.M. & M.M. Elson-Harris (1992). *Fruit Flies of Economic Significance: Their Identification and Bionomics*. CAB international. Wallingford, 768 pp.



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. Karen 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. Karen 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. Priyadarshan 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. 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. Priyadarshan 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. Rixonker, 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

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. Biju, 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 Jayopal, 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 Inskip, Bishop Auckland Co., Durham, UK
Dr. Tim Inskip, 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. Azeem, 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, Budhanilkantha Municipality, Kathmandu, Nepal
Dr. Susan Cheyne, Borneo Nature Foundation International, Palangkaraya, 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 Helleni 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. Bharat Baviskar, Wild-CER, Nagpur, Maharashtra 440013, India

Reviewers 2020–2022

Due to paucity 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

Communications

Presence of medium and large sized terrestrial mammals highlights the conservation potential of Patharia Hill Reserve in Bangladesh

– M. Aminur Rahman, Ai Suzuki, M. Sunam Uddin, M. Motalib, M. Rezaul Karim Chowdhury, Ameer Hamza & M. Abdul Aziz, Pp. 23283–23296

Diversity and abundance of aquatic birds in Koonthankulam village pond, Tamil Nadu, India

– Selvam Muralikrishnan, Esakkimuthu Shanmugam, Natarajan Arun Nagendran & Duraisamy Pandiaraja, Pp. 23297–23306

Plastral deossification zones in the Endangered Spiny Hill Turtle *Heosemys spinosa* (Testudines: Geoemydidae) on Borneo

– Siti Nor Baizurah & Indraneil Das, Pp. 23307–23314

Addition of four new records of pit vipers (Squamata: Crotalinae) to Manipur, India

– Premjit Singh Elangbam, Lal Biakzuala, Parag Shinde, Ht. Decemson, Mathipi Vabeiryureilai & Hmar Tlawmte Lalremsanga, Pp. 23315–23326

Addition to the Odonata fauna of Tripura, India

– Dhiman Datta, B.K. Agarwala & Joydeb Majumder, Pp. 23327–23337

Occurrence and distribution of two new libellulids (Odonata: Insecta) of the Kashmir Valley, India: *Orthetrum sabina* (Drury, 1770) and *Palpopleura sexmaculata* (Fabricius, 1787)

– Tahir Gazanfar & Mehreen Khaleel, Pp. 23338–23343

Rayed Thistle Fly *Tephritis cometa* Loew (Diptera: Tephritidae) a new record to India

– Rayees Ahmad, Tariq Ahmad & Barkat Hussain, Pp. 23344–23349

New state records of some Dermaptera De Geer, 1773 (Insecta) species in India

– Tanusri Das, Kochumackel George Emiliyamma & Subhankar Kumar Sarkar, Pp. 23350–23358

Moth diversity of Guindy, Chennai, India and DNA barcoding of selected erebid moths

– Seeramulu Bhavaragavan, Mani Meenakumari, Ramanathan Nivetha & Sundaram Janarthanan, Pp. 23359–23372

New record of the sphingid moth *Acherontia styx* Westwood, its parasitoid *Trichogramma achaearae* in *Jasmine Jasminum sambac* L., and its bioecology

– I. Merlin K. Davidson, Pp. 23373–23381

Identification and phylogenetic analysis of various termite species distributed across southern Haryana, India

– Bhanupriya, Shubhankar Mukherjee, Nidhi Kakkar & Sanjeev K. Gupta, Pp. 23382–23396

Survey of Black Band Disease-affected scleractinian corals via drone-based observations in Okinawa, Japan

– Rocktim Ramen Das, Parviz Tavakoli-Kolour, Sanaz Hazraty-Kari & James Davis Reimer, Pp. 23397–23402

Trace elements in *Penaeus* shrimp from two anthropized estuarine systems in Brazil

– Ana Paula Madeira Di Beneditto, Inácio Abreu Pestana & Cássia de Carvalho, Pp. 23403–23407

Aquatic Hemiptera inhabiting rice fields in Karaikal, Puducherry, India

– M. Kandibane & L. Gopianand, Pp. 23408–23415

Leaf defoliation and *Tabernaemontana rotensis* (Asterids: Gentianales: Apocynaceae) flower induction and fruit development

– Thomas E. Marler, Pp. 23416–23424

Short Communications

First record and DNA barcode of a scarab beetle, *Adoretus kanarensis* Arrow, 1917 (Coleoptera: Scarabaeidae: Rutelinae), from Maharashtra, India

– Pranil Jagdale, Sujata Magdum, Aparna Sureshchandra Kalawate, Swapnil Kajale & Yogesh Shouche, Pp. 23425–23430

New record of *Lucilia cuprina* (Wiedemann, 1830) (Diptera: Calliphoridae) from the Trans-Himalayan Region, cold arid desert of Kargil Ladakh, India

– Mohd Hussain, Altaf Hussain Mir, Hidayatullah Tak & Nassreen Fatima Kacho, Pp. 23431–23435

On the occurrence of *Nitella myriotricha* A.Braun ex Kützing, 1857 ssp. *acuminata* D.Subramanian, 1999 (Charophyceae: Charales: Characeae), from eastern India

– Kailash Mondal & Jai Prakash Keshri, Pp. 23436–23440

Notes

Dark Clouds Ahead? Anecdotal evidence for an illegal live trade in Sunda *Neofelis diardi* and Indochinese *N. nebulosa* Clouded Leopards (Mammalia: Carnivora: Felidae)

– Anthony J. Giordano, Leah M. Winstead, Muhammad Ali Imron, Rustam, Jephtha Sompud, Jayaraj Vijaya Kumaran & Kurtis Jai-Chyi Pei, Pp. 23441–23445

Further photographic record of Asiatic Brush-tailed Porcupine *Atherurus macrourus* Linnaeus, 1758 (Mammalia: Rodentia: Hystricidae) from Manas National Park, Assam, India

– Urjit Bhatt, Bilal Habib & Salvador Lyngdoh, Pp. 23446–23448

Predation of the Nicobar Shrew *Crocidura nicobarica* by a Cattle Egret *Bubulcus ibis*

– G. Gokulakrishnan, C.S. Vishnu & Manokaran Kamalakkannan, Pp. 23449–23451

War prompts distress symptoms in Israeli Blind Snake

– Shahar Dubiner, Shai Meiri & Eran Levin, Pp. 23452–23454

Further distribution records of *Varadia ambolensis* (Stylommatophora: Helicarionoidea) from the state of Goa

– Nitin Sawant, Shubham Rane, Sagar Naik, Seema Vishwakarma & Mayur Gawas, Pp. 23455–23457

Eleocharis acutangula ssp. *neotropica* D.J.Rosen (Cyperaceae): a new record for southern Western Ghats, India

– Kavya K. Nair & A.R. Viji, Pp. 23458–23460

Book Review

Putting wetland science to practice: a review

– Review by Tiasa Adhya & Partha Dey, Pp. 23461–23462

Publisher & Host

