

Building evidence for conservation globally

# Journal of Threatened Taxa

10.11609/jott.2023.15.10.23931-24150

[www.threatenedtaxa.org](http://www.threatenedtaxa.org)

26 October 2023 (Online & Print)

15(10): 23931-24150

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, 5<sup>th</sup> 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](http://www.threatenedtaxa.org)  
Email: [sanjay@threatenedtaxa.org](mailto:sanjay@threatenedtaxa.org)

#### EDITORS

##### Founder & Chief Editor

**Dr. Sanjay Molur**

Wildlife Information Liaison Development (WILD) Society & Zoo Outreach Organization (ZOO),  
43/2 Varadarajulu Nagar, 5<sup>th</sup> 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](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](https://threatenedtaxa.org/index.php/JoTT/policies_various)

continued on the back inside cover

Cover: Orange Oakleaf *Kallima inachus* with colour pencils and watercolor wash by Elakshi Mahika Molur adapted from a workshop by Lenin Raj.



## *Ocimum gratissimum* L. ssp. *gratissimum* var. *macrophyllum* Briq. (Lamiaceae: Nepetoideae: Ocimeae) a new record from northeastern India

Mamita Kalita<sup>1</sup> , Nilakshee Devi<sup>2</sup>  & Diganta Narzary<sup>3</sup> 

<sup>1,2,3</sup> Department of Botany, Gauhati University, Jalukbari, Guwahati, Assam 781014, India.

<sup>1</sup> mamita.bot@gmail.com (corresponding author), <sup>2</sup> devinilakshee@gmail.com, <sup>3</sup> d\_narzary@gauhati.ac.in

**Abstract:** The genus *Ocimum* means fragrant-lipped, characterized by the presence of the upper lobe of the calyx, which is large and decurrent. *Ocimum gratissimum* L. is conventionally known as Clove Basil due to its foliage which smells like cloves. The present study reports the extant distribution of *O. gratissimum* L. ssp. *gratissimum* var. *macrophyllum* Briq. across northeastern India. It is a new distribution record for the flora of Assam and northeastern India. A comprehensive description along with photographs, taxonomic notes, and diagnostic keys has been provided to aid identification.

**Keywords:** Assam, distribution, flora, keys, lipped, taxonomy.

**Abbreviations:** L./LINN—Linnaeus | APG—Angiosperm Phylogeny Group | GPS—Global Positioning System | ARUN—Arunachal Pradesh Regional Centre, Itanagar, Arunachal Pradesh | ASSAM—Eastern Regional Centre, Shillong, Meghalaya | CAL—Central National Herbarium, Howrah, West Bengal | GUBH—Gauhati University Botanical Herbarium | BSI—Botanical Survey of India | IVH—Indian Virtual Herbarium | JSTOR—Journal Storage | G—Conservatoire et Jardin botaniques de la Ville de Genève | K/KEW—Royal Botanic Garden, Kew | MNHN—Muséum national d’Histoire naturelle | MO—Missouri Botanical Garden’s Herbarium | NY—New York Botanical Garden Herbarium | BSID—Deccan Regional Centre, Hyderabad.

**Editor:** K. Haridasan, Palakkad, Kerala, India.

**Date of publication:** 26 October 2023 (online & print)

**Citation:** Kalita, M., N. Devi & D. Narzary (2023). *Ocimum gratissimum* L. ssp. *gratissimum* var. *macrophyllum* Briq. (Lamiaceae: Nepetoideae: Ocimeae) a new record from northeastern India. *Journal of Threatened Taxa* 15(10): 24086–24091. <https://doi.org/10.11609/jott.8544.15.10.24086-24091>

**Copyright:** © Kalita 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:** None.

**Competing interests:** The authors declare no competing interests.

**Author details:** MAMITA KALITA specializes in angiosperm taxonomy and currently working as assistant professor in the Department of Botany, Digboi College, Assam. She is pursuing her doctoral degree under the guidance of Prof. Nilakshee Devi and Dr. Diganta Narzary from the Department of Botany, Gauhati University, Guwahati, Assam. PROF. NILAKSHEE DEVI is a full time faculty in the Department of Botany, Gauhati University, Guwahati, Assam. She has 15 years of teaching experience and her research expertise includes plant taxonomy, palynology, ethnobotany, medicinal plants and phytochemistry. DR. DIGANTA NARZARY is a full time associate professor in the Department of Botany, Gauhati University, Guwahati, Assam. He is actively teaching botany and microbiology subjects and doing research in the area of plant and microbial systematics, metagenomics, ethnic food microbiology and other applied microbiology aspects.

**Author contributions:** ND and DN conceptualized and supervised the research work; MK did the field and laboratory works, and drafted the manuscript. ND and DN finalized the manuscript, and MK communicated to the Journal.

**Acknowledgements:** The authors are thankful to herbarium curators/officers of herbaria, such as ASSAM, ARUN, CAL, and GUBH.



## INTRODUCTION

Commonly known as ‘Tulsi’ in Hindi and ‘Toolakhi’ in Assamese, ‘Basil’ (Empress of all herbs) descended from the greek word ‘Basileus’ which means royal, and ‘*Ocimum*’ from ‘okimon’ which purports an aromatic herb. *Ocimum* L. is chiefly an ‘East Indian’ genus (Bentham 1832). The primary centre of origin is Africa, Tropical Asia, and Central and South America, while India is the secondary centre (Pushpangadan & Sobti 1982). According to APG IV, *Ocimum gratissimum* is a member of the tribe Ocimeae Dumort., subfamily Nepetoideae Burnett in the mint family Lamiaceae Martinov (Stevens 2001 onwards). The specific epithet ‘*gratissimum*’ explains an exaggerated expression of pleasantness due to the aroma of the species. The species have a more substantial degree of fragrance than other *Ocimum* L. species (Roxburgh 1832). *O. gratissimum* has two accepted sub-specific taxa, *O. gratissimum* ssp. *gratissimum* and *O. gratissimum* ssp. *iringense* Ayob. ex Paton. The latter subspecies is confined to Tanzania, while ssp. *gratissimum* is native to the tropical and sub-tropical old world. The variety *macrophyllum* was first acknowledged by Briquet (1894) affirming the distribution of var. *macrophyllum* in India Orientalis. According to Ryding (2000), var. *macrophyllum* is widespread in the tropics from India to western Africa. The var. *macrophyllum* got introduced from or to India and later disseminated through African cultivation. The variety was acknowledged by Paton (1992) while investigating *Ocimum* L. in Africa. He found a few forms of *O. gratissimum* in Uganda and Tanzania, corresponding to var. *macrophyllum* in having lax inflorescence, calyx, and leaf indumentum. The distinction of the varieties based on morphological characteristics conceals the facts acquired from genetic and secondary product variation. Such high degree variation is found in var. *gratissimum* against var. *macrophyllum* (Vieira et al. 2001). The var. *macrophyllum* is recognized by glabrous or pubescent leaves (hairs scattered over lower nerves) and hairy inflorescence (Albuquerque & Andrade 1998). While revising the tribe *Ocimeae* Dumort., Suddee et al. (2005) distinguished both varieties of *O. gratissimum* ssp. *gratissimum* (var. *gratissimum* and var. *macrophyllum*) and their distribution from India. The var. *macrophyllum* might have arisen from var. *gratissimum* in response to environmental constrain (Paton et al. 2009).

The Indian subcontinent is acknowledged by ssp. *gratissimum*. The var. *macrophyllum* is treated within ssp. *gratissimum* and reported earlier from different states of India, except Himachal Pradesh, Jammu &

Kashmir, Uttarakhand, and northeastern India. In the present study, the variety *macrophyllum* is being reported for the first time from Assam.

## MATERIALS AND METHODS

The specimens of the var. *macrophyllum* were collected from Jorhat district of Assam during our field survey conducted in 2019–22. Field photographs and GPS locations were recorded using a digital camera. The micro-morphological features were investigated on living specimens using a Labomed CZM4 stereo zoom binocular microscope. Further, photo plates were prepared using Adobe Photoshop 7.0. The variety was identified by consulting regional and national herbaria, such as ARUN, ASSAM, CAL, and GUBH, and through relevant literature (Floras, Journals, Revisions, and Synopsis). The microfilms of herbarium specimens from online databases BSI-IVH, G, JSTOR, KEW, LINN, MNHN, MO, and NY were also consulted for identification. The new distributional record of the variety was confirmed through research articles and literary works such as checklist, flora, and floristic records of northeastern India, along with physical verification of herbarium records held by ARUN, ASSAM, CAL, and GUBH. The morphological affirmations were correlated with lectotype G00018935 and photographs acquired from MNHN (Image 1). The common and vernacular names are given in English (E), Hindi (H), and Assamese (A).

## TAXONOMIC TREATMENT

***Ocimum gratissimum* L. ssp. *gratissimum* var. *macrophyllum* Briq.**

Bull. Herb. Boissier 2: 120.1894; Paton in Kew Bulletin. 47: 417.1992; Paton, Harley & Harley in Holm & Hiltunen, Basil: *Ocimum*. 25.1999; Ryding in Fl. Somalia 3: 341.2006.

**Type:** Lectotype (LT): G00018935, Madagascar, Bourbon, Boivin L.H. LT present in Conservatoire et Jardin botaniques de la Ville de Genève (G) and photo of type in K!

**Description:** Perennial shrubs, 1.5–2 m tall; Stem erect, much branched, woody at the base, rounded quadrangular, glabrous; Leaves 6–12 × 4.5–7 cm in size, serrate, surface smooth, hairs restricted to veins beneath, apex acuminate, multicostate divergent reticulate venation; Petiole 1.5–4 cm long, slender; Inflorescence 15–22 cm long, lax, axis glabrescent, verticils 0.8–1.2 cm apart; Bracts 3–4 × 1.8–2.5 mm, green, ovate with broad base, caducous, apex acute, base cordate, sub sessile or

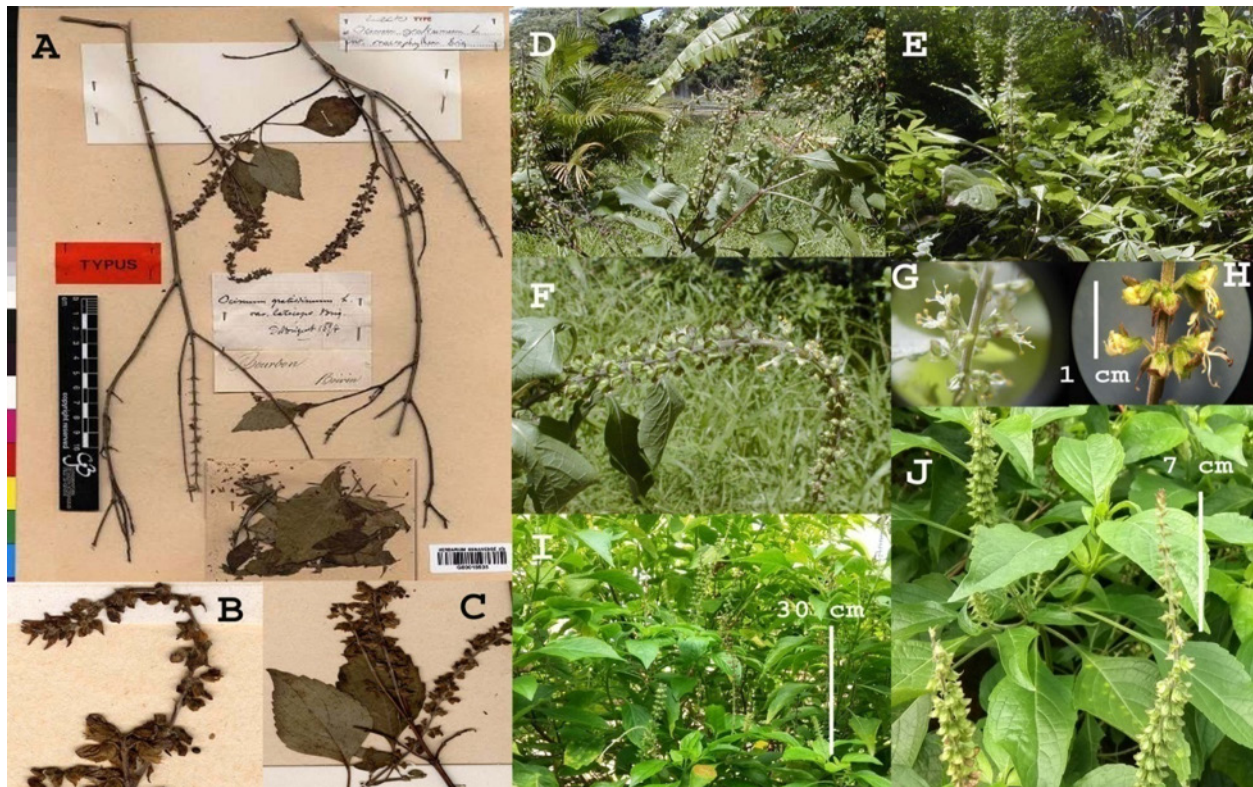


Image 1. *O. gratissimum* L. ssp. *gratissimum* var. *macrophyllum* Briq: A–C—Lectotype specimen (G00018935) | B—Magnified view of inflorescence | C—Leaves | D—PDIG00000651 | E—PDIG00001680 | F—PDIG00000652 | G—PDIG00001681 | H—Magnified sight of verticils and flowers | I—Habit | J—Leaves with Inflorescence. Source: (A–C) Reproduced with permission from Catalogue des herbiers de Genève (CHG) | (D–G) with permission from Fabien Barthelat / Muséum national d’Histoire naturelle (MNHN–Paris) | (H–J) © Mamita Kalita.

sessile, margin ciliate, pubescent on both sides; Pedicels 3–3.5 mm long, pubescent, spreading, recurved; Calyx 2–3.2 × 2–3.5 mm, slightly downwards pointing against the inflorescence axis, green, slightly purplish at tips, posterior lip rounded, wider at tip, acute apex, decurrent on tube, anterior lip shorter than posterior, two hooked lateral curved teeth (uncinate lip) slightly lower than the two median teeth, median lobes of anterior lip pressed against posterior one in fruiting calyx, throat closed, tube with patent hairs or without; Corolla 4–5.5 × 2–3 mm, light pastel yellow, barely exceeding the calyx, lobes obscurely crenate, minute hairs at back, posterior lip oblong and comparatively shorter than anterior lip, lobes are equal in length, anterior lip boat shaped, tube straight, puberulous outside, glabrous inside; Stamens 4.5–5 mm, occasionally equal in length with anterior stamens, posterior pair having tufts of hairs at base (barbate filament base); Gynoecium 6.5–8 mm, two equal lobes, curled bifid stigma, ovary more or less globose; Nutlets 1.8–2.2 × 1.5–2 mm, ivory in colour, brown at maturity, sub globose, minutely tuberculate, producing mucilage when wet (Image 2).

**Flowering and Fruiting:** It was observed in July.

**Common names:** African Basil, Clove Basil, East Indian Basil, Russian Basil, Shrubby Basil, Tree Basil, Wild Basil, Tea Bush (E), Ban Tulsi, Jangli Tulsi, Vriadhha Tulsi, Mali Tulsi, Ram Toolsee (H) and Ram toolakhi (A).

**Key to the Infra-specifics of *Ocimum gratissimum* L.**

1. Flower verticils 1–1.5 cm apart, not strongly reflexed towards the inflorescence axis; flowering and fruiting calyces recurved ..... *O. gratissimum* ssp. *gratissimum*
2. Inflorescence 10–13 cm long, dense, axis softly pubescent; leaves pubescent on both sides; calyx horizontal or slightly upward pointing ..... *O. gratissimum* var. *gratissimum*
2. Inflorescence 15–22 cm long, lax, axis glabrescent; hairs restricted to veins beneath; calyx downward pointing ..... *O. gratissimum* var. *macrophyllum*
1. Flower verticils 0.7–1.0 cm apart, strongly reflexed towards the inflorescence axis; flowering and fruiting calyces decurved ..... *O. gratissimum* ssp. *iringense*

### Specimen examined

**Africa:** Réunion. Boivin, L.H. -21.1216E, 55.5380S. *O. gratissimum* L. var. *macrophyllum* Briq. Herbarium Genavense (G), Lectotype (G00018935!). **Madagascar:** L.J. Dorr, 24.ii.1985. Original material? of *O. gratissimum* var. *macrophyllum* Briq. MO-694055! Coll.No.3779. Verified by Paton, 1998. **Bangladesh:** Flora of Chittagong hill tracts, Dr. King's Collector, viii.1886, Herb. Hort. Bot. Calcuttensis, CAL 351774! CAL 351775! **India, Andhra Pradesh:** Godavari, M.S. Ramaswami, 13.viii.1914, CAL 351792! Coll.No.1682; East Godavari, Daragatta, M. Mohanan, 17.xii.1993, altitude 550m, BSID0005839! Coll.No.100749. **Assam:** Flora of North Cachar, Haflong, William Craib, 17.viii.1908, Herb. Hort. Bot. Calcuttensis, CAL 351776! Koliapani, N. Kalita & S. Haque, 20.v.2001, ARUN000012603! and 16.xii.2008, ARUN000012604! **Karnataka:** Flora of North Kanara, W.A. Talbot, 1889, CAL 351800! Coll.No.1935; Coorg, Mercara, B.C. Banerjee, 31.x.1976, CAL 0000008663! Coll.No.11686. **Kerala:** Flora of Travancore, Quilon, M. Rama Rao, 13.viii.1913, CAL 351785! Coll.No.2252; Kozhikode, Kapad Shore, T.A. Rao, 09.xi.1972, CAL 11412! Coll.No.9839. **Lakshadweep:** Chetlat Island, B.M. Wadhwa, 28.ii.1959, CAL 6616! CAL 6617! Coll.No.49132. **Manipur:** Flora of Munneypore, Irang, C.B. Clarke, 27.xi.1885, CAL 351777! Flora of Manipur, Bishenpur, A. Meebold, xi.1907, No accession number. **Odisha:** Ganjam, Rocky hill Gopalpur, D. Prain, 1889, CAL 351793! Ramgiri, G.V. Subba Rao 19.xii.1962, ASSAM 36069! ASSAM 36070! **Tamil Nadu:** Coimbatore, Bolampatti Valley, C.E.C. Fisher, 22.ix.1900, altitude 1600m, CAL 351790! Coll. No.2205; AlagarKoil reserve forest, S. R. Srinivasan, 20.x.1988, altitude 300 m, BSID0012445! Coll. No.89407. **Telangana:** Khammam, Perantappally Forest, Pappikonda Hills, R. Chandrasekaran, 19.ii.1994, altitude 250 m, BSID0005841! Coll.No.98988; Borapuram (Mahabubnagar), B. Sadasivaiah & S. Khadar Basha, 04.xi.2008, altitude 615 m, BSID0005843! Coll.No.32360. **Tripura:** Rajnagar, B.K. Huidrom, 26.viii.1995, ASSAM 57229! **Assam:** Jorhat, Near Hoollongapar Gibbon sanctuary, 26.6785654N 94.3555723E, altitude 93 m, 21.vii.2019, Mamita Kalita, Coll.No. 63 (JHOG02).

### Taxonomic note

The variety epithet '*macrophyllum*' is a Greek word which intent large-sized leaves of the specimen. Earlier, five varieties of ssp. *gratissimum*, have been recognized, one by Hooker (1885) and the rest four by Briquet (1894, 1898). Hooker (1885) reduced *O. suave* Willd. to a variety of *O. gratissimum* var. *suavis*, and distinct the

variety from *O. gratissimum* in leaf pubescence. Briquet (1894) established three varieties, viz., *macrophyllum*, *mascarenarum*, *hildebrandtii*, and later *subdentatum* in 1898. However, only a single variety (*macrophyllum*) is acknowledged, and the others are accepted as synonyms. Morton (1962) found insufficient evidence for establishing intermediates of *O. gratissimum*. He considered *O. suave* and *O. gratissimum* as different species based on chromosome number,  $2n = 64$  and  $2n = 40, 48$ , respectively. Similar chromosome numbers ( $2n = 64$ ) were obtained by Darlington & Wylie (1955) from the Indian material of *O. gratissimum*. Also, differences based on leaf epidermal characteristics were analyzed by Olowokudejo & Pereira-Shateolu (1988). Khosla (1995) found *O. suave* contrasting from *O. viride* Willd. and *O. gratissimum*. Based on taxonomic and genetic relationships, he further concluded their origin from a common ancestor. Currently, both *O. suave* and *O. viride* exists as a synonym of *O. gratissimum* ssp. *gratissimum*. The var. *macrophyllum* is definite from var. *gratissimum* in having lax inflorescence and sparse indumentum. This incarceration is held up by referencing Indian material, where the discontinuity between the two varieties is also supported. The consulted herbarium specimens ARUN000012603, ARUN000012604, CAL 351776 pertaining to Assam and CAL 351777, ASSAM 57229 of Manipur and Tripura, respectively, are identified as *Ocimum gratissimum*. However, these specimens were found morphologically dissimilar from the variety described in the present study. Thus, it led to an establishment of new distribution record for the var. *macrophyllum* in northeastern India.

### DISCUSSION

The species *O. gratissimum* popularly known as scent leaf, has potential bioactive compounds such as polyphenols and flavonoids. The var. *macrophyllum* is undoubtedly similar to clove basil, which may serve as an alternative to drugs. The variety can also make its appearance as a new medicinal plant. *O. gratissimum* L. ssp. *gratissimum* var. *macrophyllum* Briq. is a new distributional record for northeastern India and Assam. The investigations of var. *macrophyllum* are similar to the description given by Paton (1992) while revising the tribe *Ocimeae* in Africa. The present study has provided comprehensive data on the odoriferous specimen's diagnosis, distribution, elucidation, and taxonomic status.

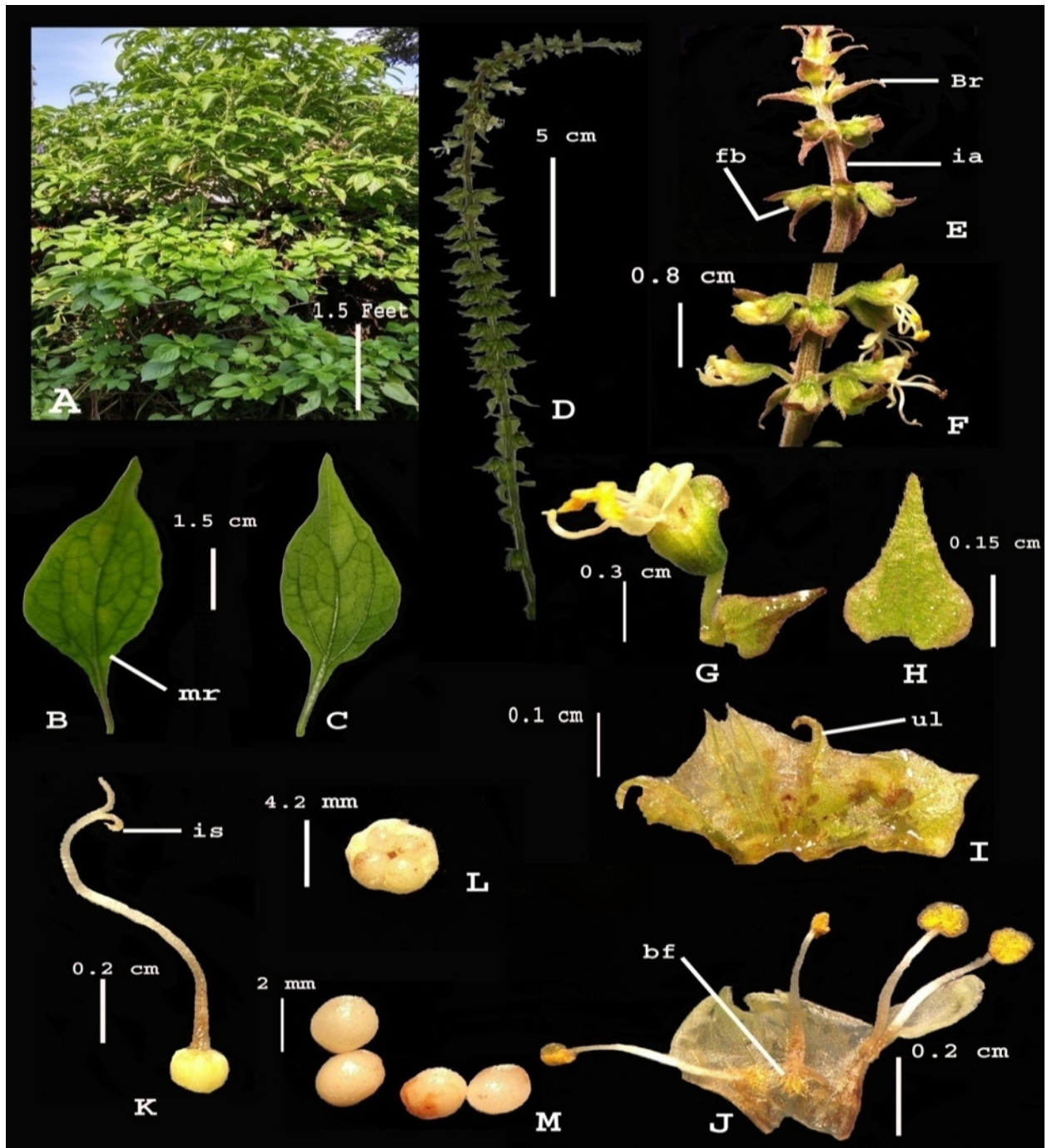


Image 2. *Ocimum gratissimum* L. ssp. *gratissimum* var. *macrophyllum* Briq: A—Habit of the plant | B—Leaf adaxial side showing multicostate reticulate (mr) venation | C—Leaf abaxial side | D—Inflorescence | E—Inflorescence tip showing flower bud (fb), inflorescence axis (ia) and bract (Br) | F—Closure view of inflorescence showing floral arrangement | G—Complete flower | H— Bract | I—Calyx dissected view displaying unciniate lip (ul) | J—Dissected corolla showing epipetalous stamen, barbate filament (bf) base | K— Gynoecium exhibiting gynobasic incurved style (is) and bifid stigma | L—Ovary revealing ovules | M—Nutlets. © Mamita Kalita.

## REFERENCES

Albuquerque, U.P. & L.H.C. Andrade (1998). El género *Ocimum* L. (Lamiaceae) en el Nordeste del Brasil. *Anales del Jardín Botánico*

de Madrid 56(1): 43–64. <https://doi.org/10.3989/ajbm.1998.v56.i1.219>

Benthams, G. (1832). *Labiatarum Genera Et Species*. James Ridgway and Sons, London, 1 pp.

Briquet, J. (1894). *Fragmenta Monographiae Labiatarum*, pp. 120. In: Boissier, A.L.H. *Bulletin De L'Herbier Boissier*. Genève Imprimerie

Romet Boulevard De Plainpalais 2: 736 pp.

**Briquet, J. (1898).** *Annuaire du Conservatoire et du Jardin Botaniques de Genève*. Conservatoire Botanique Genève, 2: 242 pp.

**Darlington, C.D. & A.P. Wylie (1955).** *Chromosome Atlas of Flowering Plants*. George Allen and Unwin Limited, London, 328 pp.

**Hooker, J.D. (1885).** *The Flora of British India*. Reeve and Company Limited, Ashford, Kent. 4: 609 pp.

**Khosla, M.K. (1995).** Study of Inter-relationship, phylogeny, and evolutionary tendencies in genus *Ocimum*. *Indian Journal of Genetics and Plant Breeding* 55(1): 71–83.

**Morton, J.K. (1962).** Cytotaxonomic studies on the West African Labiatae. *Botanical Journal of the Linnean Society* 58(372): 231–283. <https://doi.org/10.1111/j.1095-8339.1962.tb00896.x>

**Olowokudejo, J.D. & O. Pereira-Shateolu (1988).** Taxonomic value of epidermal characters in the genus *Ocimum* (Lamiaceae). *Phytomorphology* 38(2–3): 147–158.

**Paton, A.J. (1992).** A synopsis of *Ocimum* L. (Labiatae) in Africa. *Kew Bulletin* 47(3): 403–435. <https://doi.org/10.2307/4110571>

**Paton, A. J., G. Bramley, O. Ryding, R. M. Polhill, Y. B. Harvey, M. Iwarsson, F. Willis, P. B. Phillipson, K. Balkwill, C. W. Lukhoba, D. F. Otieno & R. M. Harley (2009).** Lamiaceae (Labiatae), pp. 137–174. In: Beentje, H.J., S.A. Ghazanfar & R.M. Polhill (eds.). *Flora*

*of Tropical East Africa (FTEA)*. East African Governments by Royal Botanic Gardens, Kew, UK, 436 pp.

**Pushpangadan, P. & S.N. Sobti (1982).** Cytogenetical Studies in the Genus *Ocimum* L. Origin of *O. americanum*, cytotaxonomical and experimental proof. *Cytologia* 47(3–4): 575–583. <https://doi.org/10.1508/cytologia.47.575>

**Roxburgh, W. & W. Carey (1832).** *Flora Indica, or Descriptions of Indian Plants*. Serampore, Printed for W. Thacker and Company Calcutta, Parbury, Allen and Company, London. 3: 17pp. <https://doi.org/10.5962/bhl.title.590>

**Ryding, O. (2000).** Lamiaceae (Labiatae), pp. 341. In: Thulin, M. *Flora Somalia*. Kew Richmond, Royal Botanic Gardens, UK, 626pp.

**Suddee, S., A.J. Paton & J.A.N. Parnell (2005).** Taxonomic Revision of Tribe Ocimeae Dumort. (Lamiaceae) in Continental South East Asia III. Ociminae. *Kew Bulletin* 60(1): 3–75.

**Stevens, P.F. (2001 onwards).** Angiosperm Phylogeny Website, Version 14. <http://www.mobot.org/MOBOT/research/APweb/> Electronic version accessed on 20 April 2023.

**Vieira, R.F., R.J. Grayer, A. Paton & J.E. Simon (2001).** Genetic diversity of *O. gratissimum* L. based on volatile oil constituents, flavonoids and RAPD markers. *Biochemical Systematics and Ecology* 29(3): 287–304. [https://doi.org/10.1016/S0305-1978\(00\)00062-4](https://doi.org/10.1016/S0305-1978(00)00062-4)





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, 5<sup>th</sup> Street West, Ganapathy, Coimbatore,  
Tamil Nadu 641006, India  
ravi@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](http://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)

October 2023 | Vol. 15 | No. 10 | Pages: 23931–24150

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

DOI: 10.11609/jott.2023.15.10.23931-24150

[www.threatenedtaxa.org](http://www.threatenedtaxa.org)

## Articles

### Echolocation call characterization of insectivorous bats from caves and karst areas in southern Luzon Island, Philippines

– Renz Angelo Duco, Anna Pauline de Guia, Judeline Dimalibot, Phillip Alviola & Juan Carlos Gonzalez, Pp. 23931–23951

### Seasonality, diversity, and forest type associations of macro moths (Insecta: Lepidoptera: Heterocera) in the Shiwalik landscape of northern India and its conservation implications

– Arun Pratap Singh & Lekhendra, Pp. 23952–23976

### Vertebrate assemblages on fruiting figs in the Indian eastern Himalaya's Pakke Wildlife Sanctuary

– Akangkshya Priya Gogoi, Janmejey Sethy, Awadhesh Kumar, Dipika Parbo, Murali Krishna Chatakonda & Ajay Maletha, Pp. 23977–23989

## Communications

### From the Arabian Peninsula to Indian shores: Crab Plover *Dromas ardeola* Paykull, 1805 (Aves: Charadriiformes: Dromadidae) breeding at Point Calimere, India

– H. Byju, N. Raveendran & K.M. Aarif, Pp. 23990–23995

### Assessing avian diversity and conservation status in Dighal Wetlands, Haryana, India

– Parul & Parmesh Kumar, Pp. 23996–24008

### Studies on the response of House Sparrow *Passer domesticus* to artificial nest-boxes in rural Arakkonam and Nemili taluks, Vellore District, Tamil Nadu, India

– M. Pandian, Pp. 24009–24015

### Threat assessment and conservation challenges for the herpetofaunal diversity of Dampa Tiger Reserve, Mizoram, India

– Sushanto Gouda, Ht. Decemson, Zoramkhuma, Fanai Malsawmdawngliana, Lal Biakzuala & Hmar Tlawmte Lalremsanga, Pp. 24016–24031

### Taxonomy and conservation status of swamp eels (Synbranchiformes: Synbranchidae) of West Bengal, India

– Ram Krishna Das, Pp. 24032–24042

### Sacred river of Pune: boon or bane for the diversity of aquatic beetles (Insecta: Coleoptera)

– Rita Deb, Pallavi Takawane & K.A Subramanian, Pp. 24043–24053

### Fine structure of sensilla on the proboscis of the Indian Honey Bee *Apis cerana indica* Fabricius (Insecta: Hymenoptera: Apidae)

– A.G. Suhas Krishna, Shamprasad Varija Raghu & Rajashekhar K. Patil, Pp. 24054–24062

### A compendium of *Aphelenchoides* (Fischer, 1894) (Nematoda: Tylenchida: Aphelenchoidea) nematodes with the description of a new species from Manipur, India

– Loukrakpam Bina Chanu & Naorem Mohilal, Pp. 24063–24078

### Efficacy of levamisole and oxclozanide treatment on gastrointestinal nematodes of ungulates at the Central Zoo, Nepal

– Pratik Kiju, Amir Sadoula, Parbat Jung Thapa & Chiranjibi Prasad Pokheral, Pp. 24079–24085

### *Ocimum gratissimum* L. ssp. *gratissimum* var. *macrophyllum* Briq. (Lamiaceae: Nepetoideae: Ocimeae) a new record from northeastern India

– Mamita Kalita, Nilakshee Devi & Diganta Narzary, Pp. 24086–24091

### The study of biogeographic patterns of the genus *Parmotrema* in Wayanad District, Kerala with a new record in India

– Bibin Joseph, Edathum Thazhekuni Sinisha, Valiya Thodiyil Jaseela, Harshid Pulparambil & Nediyaarambu Sukumaran Pradeep, Pp. 24092–24103

## Review

### Diversity of Calliphoridae and Polleniidae (Diptera) in the Himalaya, India

– Meenakshi Bharti, Pp. 24104–24115

## Short Communications

### First photographic evidence of mangle manifestation in Panna Tiger Reserve, India

– Supratim Dutta & Krishnamurthy Ramesh, Pp. 24116–24119

### New locality record of Forest Spotted Gecko *Cyrtodactylus* (*Geckoella*) cf. *speciosus* (Beddome, 1870) (Reptilia: Squamata: Gekkonidae) from Thanjavur, in the eastern coastal plains of Tamil Nadu, India

– Gopal Murali, Pp. 24120–24124

### Preliminary observations of moth (Lepidoptera) fauna of Purna Wildlife Sanctuary, Gujarat, India

– Preeti Choudhary & Indu Sharma, Pp. 24125–24130

### On the occurrence of *Audouinella chalybea* (Roth) Bory, 1823, a rare freshwater red algae (Florideophyceae: Acrochaetiales: Audouinellaceae) from eastern Himalaya, India

– Jai Prakash Keshri & Jay Mal, Pp. 24131–24134

### Addition of four invasive alien plant species to state flora of Mizoram, India

– Lal Tlanhlu, Margaret Lalhlupuii, Sanatombi Devi Yumkham & Sandhyarani Devi Khomdram, Pp. 24135–24139

## Notes

### First sighting record of Western Reef-Heron *Egretta gularis* (Bosc, 1792) (Aves: Pelecaniformes: Ardeidae) from Jammu & Kashmir, India

– Parvaiz Yousuf, Semran Parvaiz, Nisheet Zehbi, Sabia Altaf, Showkat Maqbool, & Mudasir Mehmood Malik, Pp. 24140–24143

### Rare desmid genus *Bourrellyodesmus* Compère (Chlorophyceae: Desmidiaceae) in India with description of a new species (*Bourrellyodesmus indicus* Das & Keshri sp. nov.) from eastern Himalaya, India

– Debjyoti Das & Jai Prakash Keshri, Pp. 24144–24147

### Threats faced by *Humboldtia bourdillonii* Prain (Magnoliopsida: Fabales: Fabaceae), an endangered tree endemic to the southern Western Ghats, India

– Jithu K. Jose & K. Anuraj, Pp. 24148–24150

Publisher & Host

