



Open Access

10.11609/jott.2022.14.1.20311-20538
www.threatenedtaxa.org

26 January 2022 (Online & Print)
14(1): 20311-20538
ISSN 0974-7907 (Online)
ISSN 0974-7893 (Print)



ISSN 0974-7907 (Online); ISSN 0974-7893 (Print)

Publisher
Wildlife Information Liaison Development Society
www.wild.zooreach.org

Host
Zoo Outreach Organization
www.zooreach.org

No. 12, Thiruvannamalai Nagar, Saravanampatti - Kalapatti Road, Saravanampatti,
Coimbatore, Tamil Nadu 641035, India
Ph: +91 9385339863 | www.threatenedtaxa.org
Email: sanjay@threatenedtaxa.org

EDITORS

Founder & Chief Editor

Dr. Sanjay Molur

Wildlife Information Liaison Development (WILD) Society & Zoo Outreach Organization (ZOO),
12 Thiruvannamalai Nagar, Saravanampatti, Coimbatore, Tamil Nadu 641035, India

Deputy Chief Editor

Dr. Neelesh Dahanukar

Noida, Uttar Pradesh, India

Managing Editor

Mr. B. Ravichandran, WILD/ZOO, Coimbatore, India

Associate Editors

Dr. Mandar Paingankar, Government Science College Gadchiroli, Maharashtra 442605, India

Dr. Ulrike Streicher, Wildlife Veterinarian, Eugene, Oregon, USA

Ms. Priyanka Iyer, ZOO/WILD, Coimbatore, Tamil Nadu 641035, India

Dr. B.A. Daniel, ZOO/WILD, Coimbatore, Tamil Nadu 641035, India

Editorial Board

Dr. Russel Mittermeier

Executive Vice Chair, Conservation International, Arlington, Virginia 22202, USA

Prof. Mewa Singh Ph.D., FASc, FNA, FNAsc, FNAPsy

Ramanna Fellow and Life-Long Distinguished Professor, Biopsychology Laboratory, and
Institute of Excellence, University of Mysore, Mysuru, Karnataka 570006, India; Honorary
Professor, Jawaharlal Nehru Centre for Advanced Scientific Research, Bangalore; and Adjunct
Professor, National Institute of Advanced Studies, Bangalore

Stephen D. Nash

Scientific Illustrator, Conservation International, Dept. of Anatomical Sciences, Health Sciences
Center, T-8, Room 045, Stony Brook University, Stony Brook, NY 11794-8081, USA

Dr. Fred Pluthero

Toronto, Canada

Dr. Priya Davidar

Sigur Nature Trust, Chadapatti, Mavinahalla PO, Nilgiris, Tamil Nadu 643223, India

Dr. Martin Fisher

Senior Associate Professor, Battcock Centre for Experimental Astrophysics, Cavendish
Laboratory, JJ Thomson Avenue, Cambridge CB3 0HE, UK

Dr. John Fellowes

Honorary Assistant Professor, The Kadoorie Institute, 8/F, T.T. Tsui Building, The University of
Hong Kong, Pokfulam Road, Hong Kong

Prof. Dr. Mirco Solé

Universidade Estadual de Santa Cruz, Departamento de Ciências Biológicas, Vice-coordenador
do Programa de Pós-Graduação em Zoologia, Rodovia Ilhéus/Itabuna, Km 16 (45662-000)
Salobrinho, Ilhéus - Bahia - Brasil

Dr. Rajeev Raghavan

Professor of Taxonomy, Kerala University of Fisheries & Ocean Studies, Kochi, Kerala, India

English Editors

Mrs. Mira Bhojwani, Pune, India

Dr. Fred Pluthero, Toronto, Canada

Mr. P. Ilangoan, Chennai, India

Web Development

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

Typesetting

Mr. Arul Jagadish, ZOO, Coimbatore, India

Mrs. Radhika, ZOO, Coimbatore, India

Mrs. Geetha, ZOO, Coimbatore India

Fundraising/Communications

Mrs. Payal B. Molur, Coimbatore, India

Subject Editors 2018–2020

Fungi

Dr. B. Shivaraju, Bengaluru, Karnataka, India

Dr. R.K. Verma, Tropical Forest Research Institute, Jabalpur, India

Dr. Vatsavaya S. Raju, Kakatiya University, Warangal, Andhra Pradesh, India

Dr. M. Krishnappa, Jnana Sahyadri, Kuvempu University, Shimoga, Karnataka, India

Dr. K.R. Sridhar, Mangalore University, Mangalagangothri, Mangalore, Karnataka, India

Dr. Gunjan Biswas, Vidyasagar University, Midnapore, West Bengal, India

Plants

Dr. G.P. Sinha, Botanical Survey of India, Allahabad, India

Dr. N.P. Balakrishnan, Ret. Joint Director, BSI, Coimbatore, India

Dr. Shonil Bhagwat, Open University and University of Oxford, UK

Prof. D.J. Bhat, Retd. Professor, Goa University, Goa, India

Dr. Ferdinando Boero, Università del Salento, Lecce, Italy

Dr. Dale R. Calder, Royal Ontario Museum, Toronto, Ontario, Canada

Dr. Cleofas Cervancia, Univ. of Philippines Los Baños College Laguna, Philippines

Dr. F.B. Vincent Florens, University of Mauritius, Mauritius

Dr. Merlin Franco, Curtin University, Malaysia

Dr. V. Irudayaraj, St. Xavier's College, Palayamkottai, Tamil Nadu, India

Dr. B.S. Kholia, Botanical Survey of India, Gangtok, Sikkim, India

Dr. Pankaj Kumar, Kadoorie Farm and Botanic Garden Corporation, Hong Kong S.A.R., China

Dr. V. Sampath Kumar, Botanical Survey of India, Howrah, West Bengal, India

Dr. A.J. Solomon Raju, Andhra University, Visakhapatnam, India

Dr. Vijayasankar Raman, University of Mississippi, USA

Dr. B. Ravi Prasad Rao, Sri Krishnadevaraya University, Anantpur, India

Dr. K. Ravikumar, FRLHT, Bengaluru, Karnataka, India

Dr. Aparna Watve, Pune, Maharashtra, India

Dr. Qiang Liu, Xishuangbanna Tropical Botanical Garden, Yunnan, China

Dr. Noor Azhar Mohamed Shazili, Universiti Malaysia Terengganu, Kuala Terengganu, Malaysia

Dr. M.K. Vasudeva Rao, Shiv Ranjani Housing Society, Pune, Maharashtra, India

Prof. A.J. Solomon Raju, Andhra University, Visakhapatnam, India

Dr. Mandar Datar, Agharkar Research Institute, Pune, Maharashtra, India

Dr. M.K. Janarthanam, Goa University, Goa, India

Dr. K. Karthigeyan, Botanical Survey of India, India

Dr. Errol Vela, University of Montpellier, Montpellier, France

Dr. P. Lakshminarasimhan, Botanical Survey of India, Howrah, India

Dr. Larry R. Noblick, Montgomery Botanical Center, Miami, USA

Dr. K. Haridasan, Pallavur, Palakkad District, Kerala, India

Dr. Analinda Manila-Fajard, University of the Philippines Los Banos, Laguna, Philippines

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

Dr. Afroz Alam, Banasthali Vidyapith (accredited A grade by NAAC), Rajasthan, India

Dr. K.P. Rajesh, Zamorin's Guruvayurappan College, GA College PO, Kozhikode, Kerala, India

Dr. David E. Boufford, Harvard University Herbaria, Cambridge, MA 02138-2020, USA

Dr. Ritesh Kumar Choudhary, Agharkar Research Institute, Pune, Maharashtra, India

Dr. Navendu Page, Wildlife Institute of India, Chandrabani, Dehradun, Uttarakhand, India

Invertebrates

Dr. R.K. Avasthi, Rohtak University, Haryana, India

Dr. D.B. Bastawade, Maharashtra, India

Dr. Partha Pratim Bhattacharjee, Tripura University, Suryamaninagar, India

Dr. Kailash Chandra, Zoological Survey of India, Jabalpur, Madhya Pradesh, India

Dr. Ansie Dippenaar-Schoeman, University of Pretoria, Queenswood, South Africa

Dr. Rory Dow, National Museum of Natural History Naturalis, The Netherlands

Dr. Brian Fisher, California Academy of Sciences, USA

Dr. Richard Gallon, Llandudno, North Wales, LL30 1UP

Dr. Hemant V. Ghatge, Modern College, Pune, India

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

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

Dr. Ian J. Kitching, Natural History Museum, Cromwell Road, UK

Dr. George Mathew, Kerala Forest Research Institute, Peechi, India

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

Caption: *Cyrtodactylus myintkyawthurai*, endemic to Myanmar. Medium: Water colours on watercolor sheet. © Aakanksha Komanduri



Hubner in 1819 considering *Phalaena javana* (Cramer, [1780]) from Java as type species. So far, 55 species are known from this genus including nine from India. The *Asota* species reported from India are: *caricae* (Fabricius, 1775); *plana* (Walker, 1854); *canaraica* (Moore, 1878); *egens* (Walker, 1854); *ficus* (Fabricius, 1775); *heliconia* (Linnaeus, 1758); *paphos* (Fabricius, 1787); *producta* (Butler, 1875); *sericea* (Moore, 1878). *A. ficus* was placed under the genus *Hypsa* as *Hypsa ficus* by Hampson (1892) under the family Hypsidae: section-II. Hampson (1892) divided the genus *Hypsa* under two sections on the basis of structure of antennae. In Section-I the antennae of males are fasciculated with short cilia. The fasciculated male antennae, long cilia and the long 3rd segment of palpi forms the section-II. Caterpillar of *A. ficus* is recorded feeding mainly on castor and ficus.

The genus *Asota* is responsible for Lepidopterism, a disease caused by the adult or the caterpillar of moths or butterflies (Wills et al. 2016). In Kerala India, it was reportedly caused by the tiger moth *A. caricae* (Anonymous 2016). The fever caused by Lepidopterism mimics the symptoms of the mosquito borne infectious diseases like chikungunya and dengue. The adult moths, while emerging from the pupae, extricate the scales on their body and secrete fluids (Anonymous 2016) which lead to the high fever either when in contact with the human skin or due to inhalation. As per Wills et al. (2016), allergic reactions are due to the presence of poisonous chemicals like histamines, imidazole and peptides.

DNA barcoding is a quick and reliable nucleotide-based identification technique across the animal kingdom, founded on the mitochondrial Cytochrome oxidase I gene (mt COI) by Hebert's group in 2003. The ability of COI sequences to discriminate closely allied species based on restricted intraspecific mitochondrial DNA divergence and utilizing it as an aid to resolve the alpha diversity of species in diverse taxonomic groups including Lepidoptera has been validated (Hebert et al. 2003b). These species-specific signatures, identified as DNA barcodes help to delimit the problematic taxa (Hebert et al. 2003a) also in cases where identification is not possible with the traditional taxonomic techniques alone. DNA barcode not only provides a boon to taxonomic research but also serves as a form of comprehensive, widely accessible system for identification and validation of species. Hence, in the present study an attempt has been made to develop a DNA barcode for the species *A. ficus* from Maharashtra along with its morphological description (adult together with external genitalia); the utility of mt DNA barcodes in the Indian moth studies are discussed.

MATERIALS AND METHODS

Moth specimens were collected using a light trap having mercury vapour lamp as a light source of 160 W. It was hung in the middle of the white sheet installed in the field during the night. Moth specimens that were captured were euthanized by ethyl acetate vapours. Then they were transported to the laboratory in insect packets (made of butter paper) for further analysis.

In the laboratory, the specimens were stretched, pinned and stored in entomological boxes filled with preservatives. For morphological studies the specimens were studied under Leica EZ4E stereomicroscope. The map of the collection locality was prepared using open free QGIS software. The details of the collection locality are given under the material examined and is also shown in Figure 1. Identification of the specimens was done as per Hampson (1892). Male and female genitalia were studied following Robinson (1976). The identified specimens are deposited at the National Zoological Collections of the Zoological Survey of India, Western Regional Centre, Pune, Maharashtra, India (ZSI/WRC).

DNA extraction was performed using DNeasy blood and tissue kit (Qiagen) using leg and abdomen of a dried specimen. DNA quantitation was performed by HS dsDNA assay kit on Qubit 2.0 fluorometer. Mitochondrial COI (mt COI) gene was amplified using universal primer pair, LCO1490 and HCO2198 (Folmer et al. 1994) in 25 µL reaction volume constituted by 12.5 µL of Master Mix (Promega), 10 pmol of each forward and reverse primer, 50 ng of template DNA along with Nuclease free water up to Q.S. Thermal cycling profile performed as per Kalawate et al. (2020a). Amplification of the desired gene was confirmed by gel electrophoresis stained by SYBR safe DNA gel stain (Invitrogen), visualized under UV by gel documentation system. Purification of the amplified product was done by Invitrogen's Pure Link PCR Purification Kit. The purified PCR product was sequenced bi-directionally by Sanger's method on ABI 377 (Applied Biosciences) sequencer.

Both the forward and reverse sequences generated in the current studies were verified manually for corrections. Initially 838 mt COI gene sequences available for the genus *Asota* were downloaded from the GenBank and were aligned using MEGA 5.2 software (Tamura et al. 2011). MEGA 5.2 (Tamura et al. 2013) was used for calculating uncorrected pairwise genetic distances. Initial tree was built (using MEGA 5.2) including all reported species with molecular data for the genus *Asota*, comprising 235 sequences excluding identical sequences from the same locality for a single species/subspecies. Since mt COI is not a good candidate

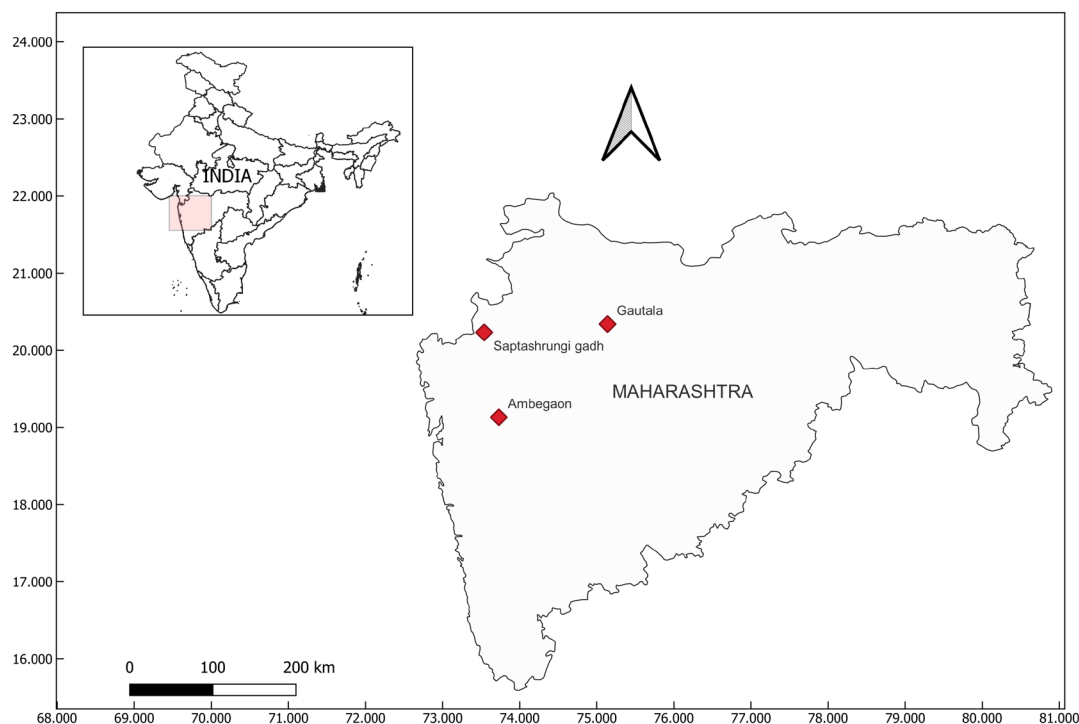


Figure 1. Collection localities of *Asota ficus* from Maharashtra, India.

gene for phylogenetic studies (Cameron et al. 2004; Lafontaine & Schmidt 2010) and our initial single gene phylogenetic tree ended up in polytomies without proper phylogenetic relationships, we considered presenting the phylogenetic tree comprising all the sequences of *A. ficus* available on the GenBank with the sequences generated by us and the probable sister species *A. speciosa* treating species *Neochera inops* as an outgroup. The phylogenetic inferences drawn are only to show the monophyly of all the sequences of *A. ficus*. Maximum likelihood tree was generated using RaxML (Silvestro & Michalak 2012) with thorough bootstrap of 1,000 replicates under the GTR+GAMMA+I model and the final consensus tree was visualized by Fig Tree v1.4.0. Sequences generated in the studies are submitted to the GenBank (OL630456.1 & OL630457.1).

RESULT AND DISCUSSIONS

Taxonomic account

Superfamily Noctuoidea Latreille, 1809

Family Erebidae Leach, [1815]

Subfamily Aganainae Boisduval, 1833

Genus *Asota* Hübner, [1819]

Asota Hübner, [1819], *Verz. bek. Schmett.* (11): 164.

Type Species: *Phalaena javana* (Cramer, [1780])

Asota ficus (Fabricius, 1775)

Noctua ficus Fabricius, 1775, *Syst. Ent.*: 595.

Lacides ficus, Moore, 188, *Lep. Ceylon*, 2(1): 53, pl. 100, f. 2.

Hypsa ficus, Hampson, 1892, *Fauna Brit. India, Moths*, 1: 504.

Type Locality. India.

Material examined/source: 01 male, Saptashringigadh, Nashik, Maharashtra, India (20.23N, 73.54E; 1,000 m), 06 November 2016, coll. A.S. Kalawate (ZSI/WRC/L-1482); 01 female, Ambegaon, Pune, Maharashtra, India (19.13N, 73.73E; 730 m), 23 June 2017, coll. A.S. Kalawate & party (ZSI/WRC/L-1780); 02 male, Bhaskaracharya Forest Rest house, Gautala, Jalgaon, Maharashtra, India (20.34N, 75.14E; 711 m), 27 September 2019, coll. P.S. Bhatnagar & party (ZSI/WRC/L-2069).

Morphological description: Adult (Image 1A,B). Wing expanse: 55 mm in male and 63 mm in female. Antennae of male fasciculated, cilia long; 3rd joint of palpi long, grey in colour, tipped with black. Head, thorax and abdomen orange-yellow; tegulae with yellow base and a black spot. Abdomen with series of black spots. Orange basal patch on forewing extending along costa and in cell to two-third length of cell, an orange spot encircled with black on the costa, and streaks in cell and on inner margin, two black spots on costa and in

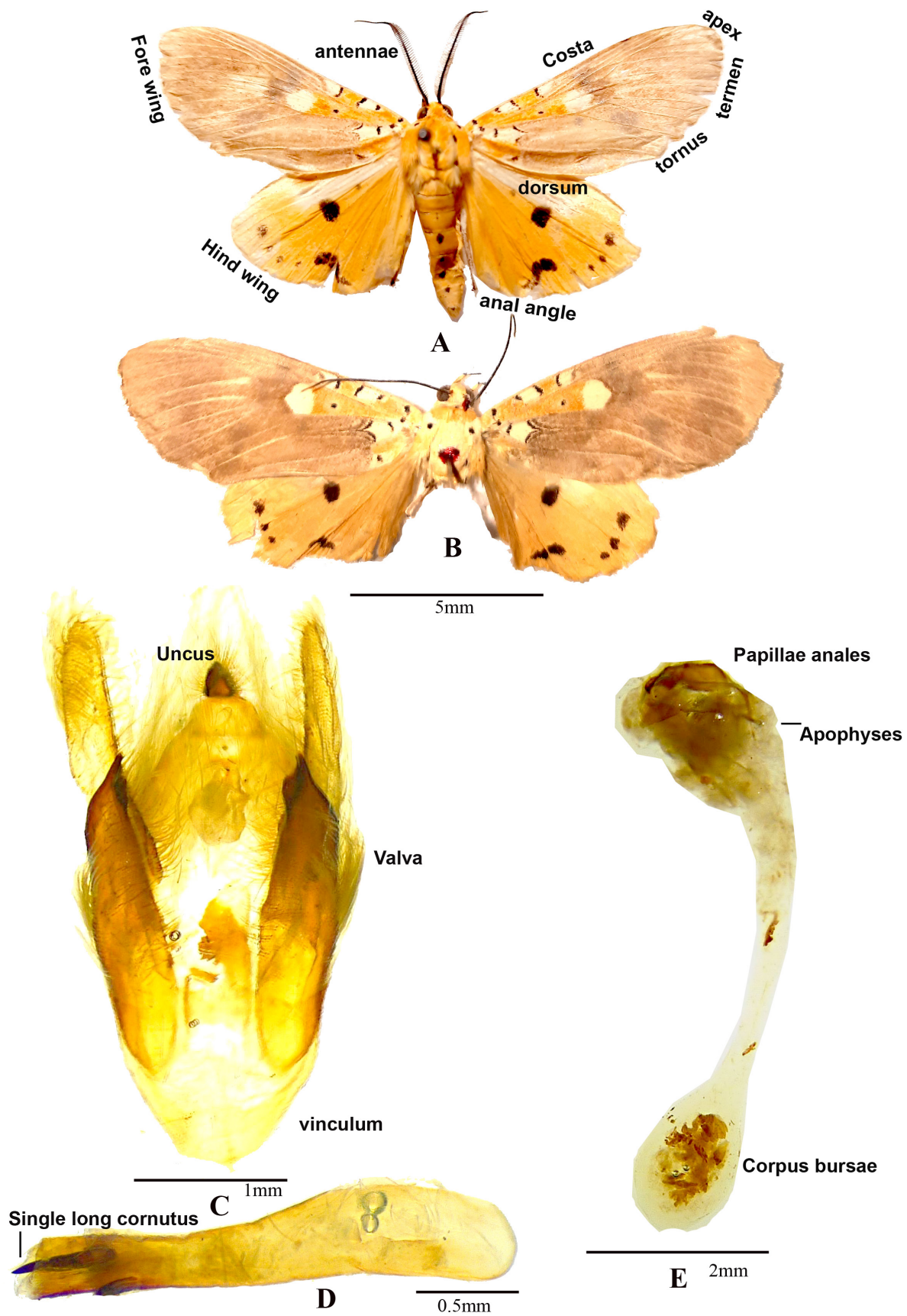


Image 1. *Asota ficus*: A—Male | B—Female | C—Genitalia | D—Aedeagus | E—Female genitalia.

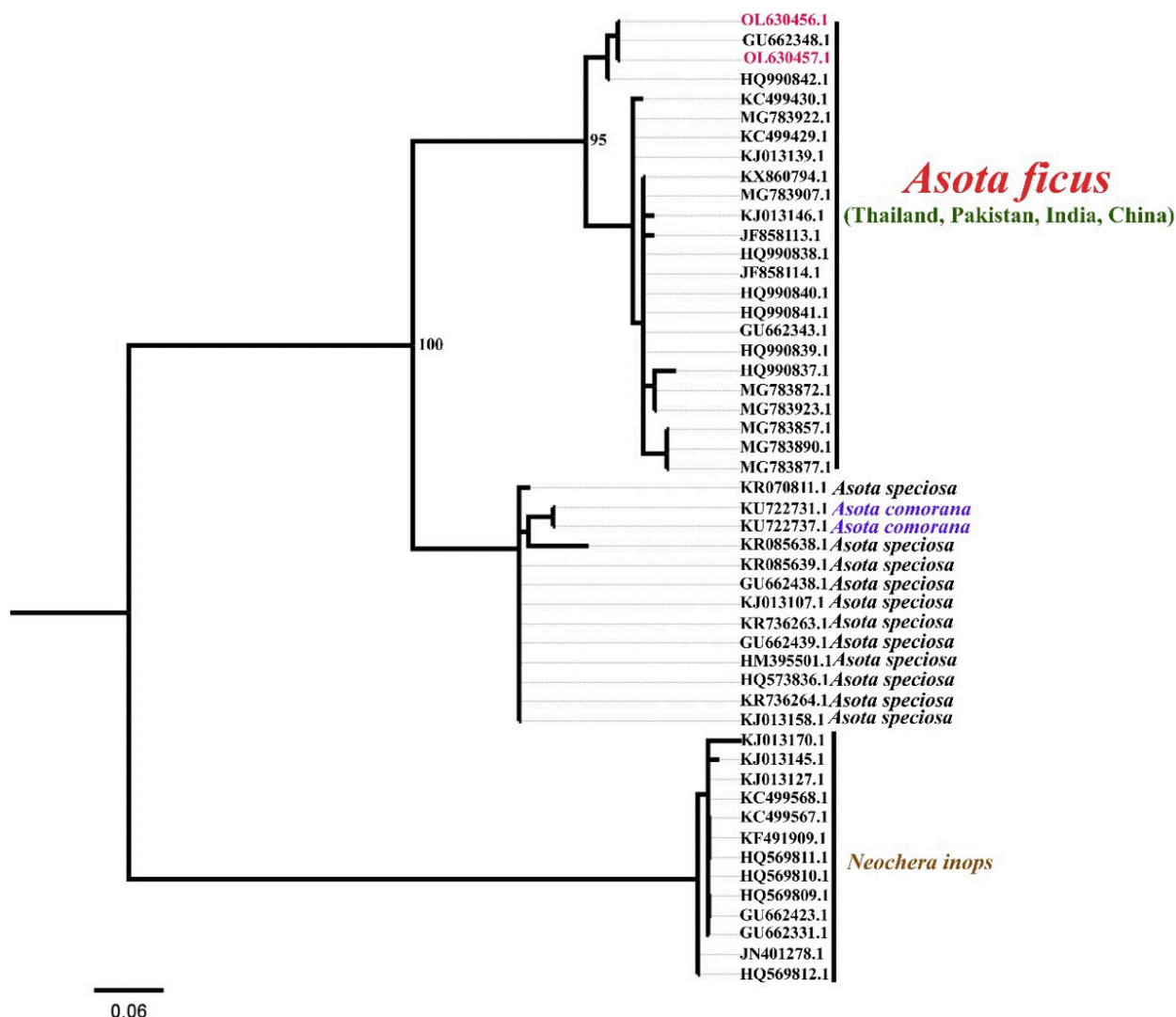


Figure 2. Maximum likelihood (ML) tree for the species of *Asota* based on the 578 bp of mitochondrial COI DNA gene sequences.

cell, one on inner margin, and two lines across intermedian interspace; rest of the wing olive-brown, the veins are striped with yellow. Hind wing bright orange-yellow; black spot at end of cell and series of irregular sized and placed black spots at submarginal area. Male and female are similar in external morphology except antennae. In male they are, fasciculated with long cilia and very short cilia in female.

Male genitalia (Image 1C). Uncus long, highly sclerotised broad till middle and then narrowing down, apex pointed recurved. Tegumen longer than the uncus, moderately sclerotised with broad arms, inverted v-shaped; valvae symmetrical, weakly sclerotised, setosed, costa strongly produced into a long process, harpe with a pointed process; vinculum longer than tegumen, u-shaped; juxta elongated; Aedeagus (Image 1D) long, relatively thin, apical portion dentate ventrally.

Vesica membranous with single, long cornutus.

Female genitalia (Image 1E). Corpus bursae oblong, membranous; ductus bursae long, membranous; ostium bursae simple, sclerotized; posterior and anterior apophyses are of equal length, sclerotized; papilla analis oval, heavily sclerotized with setae.

Distribution: India (throughout including Maharashtra), China, Japan, Malaysia, Myanmar, Nepal, Sri Lanka, Taiwan, and Thailand.

Host plants. *Ricinus communis*, *Ficus carica*, *F. hispida*, *F. racemosa*, *F. pumila*, *F. infectoria*, *F. religiosa*, and *Mitragyna diversifolia* (ICAR-NBAIR 2020).

DNA barcode studies: In the GenBank a total of 22 sequences of mt COI are available for *A. ficus* (Table 1), of which nine sequences are from India. Within India, these sequences are from the states of Assam, Maharashtra and Tamil Nadu (all are unpublished data

Table 1. Details of the mt COI GenBank accession numbers of *Asota* utilised in the construction of ML phylogenetic tree.

	GenBank Accession No.	Locality	Species name as per NCBI	Publication details as per NCBI
1	GU662348.1	Thailand: Chiang Mai	<i>Asota ficus</i>	Unpublished
2	OL630456.1	India: Maharashtra, Nasik, Saptashrungigadh.	<i>Asota ficus</i>	Current study
3	OL630457.1	India: Maharashtra, Jalgaon	<i>Asota ficus</i>	Current study
4	HQ990842.1	Pakistan	<i>Asota ficus</i>	Unpublished
5	KC499430.1	India: Tamil Nadu, Kalkad	<i>Asota ficus</i>	Unpublished
6	MG783922.1	India: Maharashtra	<i>Asota ficus</i>	Unpublished
7	KC499429.1	China: Yunnan	<i>Asota ficus</i>	Unpublished
8	KJ013139.1	India: Assam,	<i>Asota ficus</i>	Unpublished
9	KX860794.1	Pakistan: Punjab	<i>Asota ficus</i>	Ashfaq et al. (2017)
10	MG783907.1	India: Maharashtra	<i>Asota ficus</i>	Unpublished
11	KJ013146.1	India: Nameri NP	<i>Asota ficus</i>	Unpublished
12	JF858113.1	Pakistan	<i>Asota ficus</i>	Unpublished
13	HQ990838.1	Pakistan	<i>Asota ficus</i>	Unpublished
14	JF858114.1	Pakistan	<i>Asota ficus</i>	Unpublished
15	HQ990840.1	Pakistan	<i>Asota ficus</i>	Unpublished
16	HQ990841.1	Pakistan	<i>Asota ficus</i>	Unpublished
17	GU662343.1	Thailand: Chiang Mai	<i>Asota ficus</i>	Unpublished
18	HQ990839.1	Pakistan	<i>Asota ficus</i>	Unpublished
19	HQ990837.1	Pakistan	<i>Asota ficus</i>	Unpublished
20	MG783872.1	India: Maharashtra	<i>Asota ficus</i>	Unpublished
21	MG783923.1	India: Maharashtra	<i>Asota ficus</i>	Unpublished
22	MG783857.1	India: Maharashtra	<i>Asota ficus</i>	Unpublished
23	MG783890.1	India: Maharashtra	<i>Asota ficus</i>	Unpublished
24	MG783877.1	India: Maharashtra	<i>Asota ficus</i>	Unpublished
25	KR070811.1	Kenya: Kajiado North	<i>Asota speciosa</i>	Unpublished
26	KU722731.1	Comoros: Grande Comore	<i>Asota comorana</i>	Unpublished
27	KU722737.1	Comoros: Grande Comore	<i>Asota comorana</i>	Unpublished
28	KR085638.1	Zambia: Victoria Falls	<i>Asota speciosa</i>	Unpublished
29	KR085639.1	Zambia: Lusaka Ridgeway	<i>Asota speciosa</i>	Unpublished
30	GU662438.1	Nigeria: Laeinde	<i>Asota speciosa</i>	Unpublished
31	KJ013107.1	Tanzania: Mbizi forest	<i>Asota speciosa</i>	Unpublished
32	KR736263.1	Nigeria: Oyo	<i>Asota speciosa</i>	Unpublished
33	GU662439.1	Cameroon: North Province	<i>Asota speciosa</i>	Unpublished
34	HM395501.1	Gabon: WoleuNamiTchimbale	<i>Asota speciosa</i>	Unpublished
35	HQ573836.1	Gabon: Ogooue-Ivindo	<i>Asota speciosa</i>	Unpublished
36	KR736264.1	Nigeria: Oyo	<i>Asota speciosa</i>	Unpublished
37	KJ013158.1	Ethiopia: Arba Minch	<i>Asota speciosa</i>	Unpublished
38	KJ013170.1	Laos: Nang Phoa	<i>Neochera inops</i>	Unpublished
39	KJ013145.1	Laos: Nang Phoa	<i>Neochera inops</i>	Unpublished
40	KJ013127.1	Laos: Namha protected area,	<i>Neochera inops</i>	Unpublished
41	KC499568.1	Indonesia: Kalimantan Barat	<i>Neochera inops</i>	Unpublished
42	KC499567.1	China: Hainan	<i>Neochera inops</i>	Unpublished
43	KF491909.1	Malaysia	<i>Neochera inops</i>	Unpublished
44	HQ569811.1	Thailand: Nan	<i>Neochera inops</i>	Unpublished
45	HQ569810.1	India: Meghalaya	<i>Neochera inops</i>	Unpublished
46	HQ569809.1	VietNam: Tam Dao	<i>Neochera inops</i>	Unpublished
47	GU662423.1	Thailand: Chiang Mai	<i>Neochera inops</i>	Unpublished
48	GU662331.1	Thailand: Chiang Mai	<i>Neochera inops</i>	Unpublished
49	JN401278.1	Japan	<i>Neochera inops</i>	Zahiri et al. (2012)
50	HQ569812.1	Malaysia: Sarawak	<i>Neochera inops</i>	Unpublished

as per GenBank). The current study forms the first published record of DNA barcode for the species *A. ficus* from India with assigned voucher numbers.

In the preliminary phylogenetic tree generated for the studies, all the mt DNA barcodes formed a monophyletic clade for the species *A. ficus* (Figure 2) showing genetic distance variance from 0.6% to 1.3%. The clade comprising *A. speciosa* and *A. comorana* showed sister relationship with the clade of *A. ficus*, wherein genetic distance between the species *A. ficus* and *A. comorana* was 2.9% and *A. ficus* and *A. speciosa* was 3.4%. In the present study *A. comorana* is nested within *A. speciosa* which suggests either one of the species was wrongly identified ending up in mislabelled sequences or synonymy of these two taxa. Further studies are necessary to resolve the identity and validity of the species *A. comorana* as the genetic distance between the species *A. speciosa* and *A. comorana* is too shallow (0.6–1.7 %).

Evolutionary distances are fundamental in molecular reconstructions including phylogenetic analysis (Nei & Kumar 2000). The nucleotide substitution method is widely used to calculate a reliable genetic difference between pairs of sequences (Nei & Kumar 2000). Since there are limitations with the mt COI gene (Cameron et al. 2004; Hebert & Gregory 2005; Lafontaine & Schmidt 2010), we suggest further studies to comment on the phylogenetic relationships among the species of the genus *Asota*. Nuclear DNA (n DNA) studies are advocated (Zahiri et al. 2012) to study ancient evolutionary divergence for resolving deeper nodes above species level, having slower mutation rate than mt DNA.

In India, generation of mt COI DNA barcodes for moths is still in a stage of infancy. Recently, Kalawate et al (2020a) have reported the palearctic moth species *Olepa schleini* Witt et al. 2005 from India with a description of subspecies based on the DNA barcode studies and morphological variations. Additionally, Kalawate et al. (2020b) described three new species along with a subspecies and provided the description of multiple morphotypes of *Olepa* from India. These studies clearly endorse the utility of DNA barcodes in identification of palearctic species from India (Kalawate et al. 2020a). This technique further avoids taxonomic inflation by describing morphologically different looking morphotypes as a new species (Kalawate et al. 2020b). Further, DNA barcode studies are expected to alleviate identification of morphologically variant species and uncover the cryptic diversity prevailing within the taxonomic groups. Multigene phylogenetic analysis is warranted to decipher the phylogenetic relationships

across the members of the family which are wide spread in distribution range.

REFERENCES

- Anonymous (2016).** Alert issued for fever caused by tiger moth. http://timesofindia.indiatimes.com/articleshow/51869389.cms?utm_source=contentofinterest&utm_medium=text&utm_campaign=cppst assessed 01.12.2020.
- Ashfaq, M., S. Akhtar, M.A. Rafi, S. Mansoor & P.D. Hebert (2017).** Mapping global biodiversity connections with DNA barcodes: Lepidoptera of Pakistan. *PLoS ONE* 12(3): e0174749. <https://doi.org/10.1371/journal.pone.0174749>
- Bayarsaikhan, U., N. Sol-Moon & B. Yang-Seop (2016).** Review of the subfamily Aganainae (Lepidoptera, Erebidae) from Cambodia. *Journal of Asia-Pacific Biodiversity* 9(2): 219–229. <https://doi.org/10.1016/j.japb.2016.02.010>
- Cameron, S.L., K.B. Miller, C.A. D'Haese, M.F. Whiting & S.C. Barker (2004).** Mitochondrial genome data alone are not enough to unambiguously resolve the relationships of Entognatha, Insecta and Crustacea sensu lato (Arthropoda). *Cladistics* 20(6): 534–557. <https://doi.org/10.1111/j.1096-0031.2004.00040.x>
- Common, I.F.B. (1990).** Moths of Australia. E.J. Brill and Melbourne University Press, New York. 128 pp.
- Daniel, F. (1943).** Beiträge zur Kenntnis der Arctiidae Ostasiens unter besonderer Berücksichtigung der Ausbeuten H. Höne's aus diesem Gebiet (Lep. Het.). II Teil. Hypsinae, Micrarctiinae, Spilosominae, Arctiinae. Mitteilungen der München Entomologischen Gesellschaft 33: 673–759.
- Fibiger, M. & J.D. Lafontaine (2005).** A review of the higher classification of the Noctuoidea (Lepidoptera) with special reference to the Holarctic fauna. *Esperiana* 11: 7–92.
- Folmer, O., W.R. Hoeh, M.B. Black & R.C. Vrijenhoek (1994).** Conserved primers for PCR amplification of mitochondrial DNA from different invertebrate phyla. *Molecular Marine Biology and Biotechnology* 3(5): 294–299.
- Hampson, G.F. (1892).** The fauna of British India including Ceylon and Burma, Moths - Volume 1. Taylor and Francis, London, 504 pp.
- Hebert, P.D., S. Ratnasingham & J.R. deWaard (2003a).** Barcoding animal life: cytochrome c oxidase subunit 1 divergences among closely related species. *Proceedings Biological sciences* 270 (Suppl. 1): S96–S99. <https://doi.org/10.1098/rsbl.2003.0025>
- Hebert, P.D., A. Cywinska, S.L. Ball & J.R. deWaard (2003b).** Biological identifications through DNA barcodes. *Proceedings Biological Sciences* 270(1512): 313–21. <https://doi.org/10.1098/rspb.2002.2218>
- Hebert, P.D.N. & T.R. Gregory (2005).** The promise of DNA barcoding for taxonomy. *Systematic Biology* 54 (5): 852–859. <https://doi.org/10.1080/10635150500354886>
- Holloway, J.D. (1988).** The Moths of Borneo, part. 6: family Arctiidae, subfamilies Syntominiinae, Euchromiinae, Arctiinae; Noctuidae misplaced in Arctiidae (Camptoloma, Aganaiidae). SouthdeneSdnBhd, Kuala Lumpur.
- ICAR-NBAIR (2020).** *Asota ficus*. <https://www.nbair.res.in/Databases/Databases/insectpests/Asota-caricae.php?&cd=12&hl=en&ct=clnk&gl=in> accessed 08.xii.2020.
- Inoue, H., S. Sugi, H. Kuroko, A. Kawabe & M. Owada (1982).** Moths of Japan. Kodansha, Tokyo, 344–405 pp.
- Kalawate, A.S., S. Pawara, A. Shabnam & K.P. Dinesh (2020a).** DNA barcode reveals the occurrence of Palearctic *Olepa schleini* Witt et al., 2005 (Lepidoptera: Erebidae: Arctiinae) from peninsular India with morphological variations and a new subspecies. *Journal of Threatened Taxa* 12(9): 16143–16152. <https://doi.org/10.11609/jot.5596.12.9.16143-16152>
- Kalawate, A.S., K.P. Dinesh & A. Shabnam (2020b).** DNA barcoding unravels three new species and a subspecies of *Olepa* Watson, 1980 (Lepidoptera, Erebidae, Arctiinae) from India, with

- morphotypes. *Journal of Insect Biodiversity* 19(2): 44–60. <https://doi.org/10.12976/jib/2020.19.2.2>
- Kitching, I.J. & J. Rawlins (1998). The Noctuoidea, pp. 355–401. Kristensen, N.P. (ed.). *Handbook of Zoology, Lepidoptera, Moths and Butterflies, Vol. 1. Evolution, Systematics, and Biogeography*. W. de Gruyter, Berlin.
- Lafontaine, J.D. & B.C. Schmidt (2010). Annotated check list of the Noctuoidea (Insecta, Lepidoptera) of North America north of Mexico. *ZooKeys* 40: 1–239. <https://doi.org/10.3897/zookeys.40.414>
- Nei, M. & S. Kumar (2000). *Molecular Evolution and Phylogenetics*. Oxford University Press, 333 pp.
- Robinson, G.S. (1976). The preparation of slides of Lepidoptera genitalia with special reference to the Microlepidoptera. *Entomologist's Gazette* 27(2): 127–132.
- Scoble, M.J. (1992). *The Lepidoptera. Form, Function and Diversity*. Oxford University Press, Oxford, 404 pp.
- Seitz, A. (1914). The Macrolepidoptera of the world. II. Division: Fauna Exotica, A. Kernen, Stuttgart, 10: 105–290 (Bombyces and Sphinges of the Indo-Australian Region). <https://doi.org/10.5962/bhl.title.9400>
- Silvestro, D. & I. Michalak (2012). raxmlGUI: a graphical front-end for RAxML. *Organisms Diversity & Evolution* 12(4): 335–337.
- Tamura, K., D. Peterson, N. Peterson, G. Stecher, M. Nei & S. Kumar (2011). MEGA5: Molecular Evolutionary Genetics Analysis using Maximum Likelihood, Evolutionary Distance and Maximum Parsimony Methods. *Molecular Biology and Evolution* 28(10): 2731–2739. <https://doi.org/10.1093/molbev/msr121>
- Wills, P.J., M. Anjana, M. Nitin, R. Varun, P. Sachidanandan, T.M. Jacob, L. Madhavan, R.V. Thampah & K.K. Varma (2016). Population explosions of Tiger Moth lead to Lepidopterism mimicking infectious fever outbreaks. *PLoS ONE* 11(4): e0152787. <https://doi.org/10.1371/journal.pone.0152787>
- Zahiri, R., I.J. Kitching, J.D. Lafontaine, M. Mutanen, L. Kaila, J.D. Holloway & N. Wahlberg (2011). A new molecular phylogeny offers hope for a stable family level classification of the Noctuoidea (Lepidoptera). *Zoologica Scripta* 40(2): 158–173.
- Zahiri, R., J.D. Holloway, I.J. Kitching, J.D. Lafontaine, M. Mutanen, & N. Wahlberg (2012). Molecular phylogenetics of Erebidæ (Lepidoptera, Noctuoidea). *Systematic Entomology* 37(1): 102–124. <https://doi.org/doi:10.1111/j.1365-3113.2011.00607.x>



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

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, Taleigao Plateau, Goa. India
Dr. S.R. Ganesh, Chennai Snake Park, Chennai, Tamil Nadu, India
Dr. Himansu Sekhar Das, Terrestrial & Marine Biodiversity, Abu Dhabi, UAE

Birds

Dr. Hem Sagar Baral, Charles Sturt University, NSW Australia
Dr. Chris Bowden, Royal Society for the Protection of Birds, Sandy, UK
Dr. Priya Davidar, Pondicherry University, Kalapet, Puducherry, India
Dr. J.W. Duckworth, IUCN SSC, Bath, UK
Dr. Rajah Jayapal, SACON, Coimbatore, Tamil Nadu, India
Dr. Rajiv S. Kalsi, M.L.N. College, Yamuna Nagar, Haryana, India
Dr. V. Santharam, Rishi Valley Education Centre, Chittoor Dt., Andhra Pradesh, India
Dr. S. Balachandran, Bombay Natural History Society, Mumbai, India
Mr. J. Praveen, Bengaluru, India
Dr. C. Srinivasulu, Osmania University, Hyderabad, India
Dr. K.S. Gopi Sundar, International Crane Foundation, Baraboo, USA
Dr. Gombobaatar Sunde, Professor of Ornithology, Ulaanbaatar, Mongolia
Prof. Reuven Yosef, International Birding & Research Centre, Eilat, Israel
Dr. Taej Mundkur, Wetlands International, Wageningen, The Netherlands
Dr. Carol Inskipp, Bishop Auckland Co., Durham, UK
Dr. Tim Inskipp, Bishop Auckland Co., Durham, UK
Dr. V. Gokula, National College, Tiruchirappalli, Tamil Nadu, India
Dr. Arkady Lelej, Russian Academy of Sciences, Vladivostok, Russia
Dr. Simon Dowell, Science Director, Chester Zoo, UK
Dr. Mário Gabriel Santiago dos Santos, Universidade de Trás-os-Montes e Alto Douro, Quinta de Prados, Vila Real, Portugal
Dr. Grant Connette, Smithsonian Institution, Royal, VA, USA
Dr. M. Zafar-ul Islam, Prince Saud Al Faisal Wildlife Research Center, Taif, Saudi Arabia

Mammals

Dr. Giovanni Amori, CNR - Institute of Ecosystem Studies, Rome, Italy
Dr. Anwaruddin Chowdhury, Guwahati, India
Dr. David Mallon, Zoological Society of London, UK
Dr. Shomita Mukherjee, SACON, Coimbatore, Tamil Nadu, India
Dr. Angie Appel, Wild Cat Network, Germany
Dr. P.O. Nameer, Kerala Agricultural University, Thrissur, Kerala, India
Dr. Ian Redmond, UNEP Convention on Migratory Species, Lansdown, UK
Dr. Heidi S. Riddle, Riddle's Elephant and Wildlife Sanctuary, Arkansas, USA
Dr. Karin Schwartz, George Mason University, Fairfax, Virginia.
Dr. Lala A.K. Singh, Bhubaneswar, Orissa, India
Dr. Mewa Singh, Mysore University, Mysore, India
Dr. Paul Racey, University of Exeter, Devon, UK
Dr. Honnavalli N. Kumara, SACON, Anaikatty P.O., Coimbatore, Tamil Nadu, India
Dr. Nishith Dharaiya, HNG University, Patan, Gujarat, India
Dr. Spartaco Gippoliti, Socio Onorario Società Italiana per la Storia della Fauna "Giuseppe Altobello", Rome, Italy
Dr. Justus Joshua, Green Future Foundation, Tiruchirappalli, Tamil Nadu, India
Dr. H. Raghuram, The American College, Madurai, Tamil Nadu, India
Dr. Paul Bates, Harison Institute, Kent, UK
Dr. Jim Sanderson, Small Wild Cat Conservation Foundation, Hartford, USA
Dr. Dan Challender, University of Kent, Canterbury, UK
Dr. David Mallon, Manchester Metropolitan University, Derbyshire, UK
Dr. Brian L. Cypher, California State University-Stanislaus, Bakersfield, CA
Dr. S.S. Talmale, Zoological Survey of India, Pune, Maharashtra, India
Prof. Karan Bahadur Shah, Budhanilakantha Municipality, Kathmandu, Nepal
Dr. Susan Cheyne, Borneo Nature Foundation International, Palangkaraja, Indonesia
Dr. Hemanta Kafley, Wildlife Sciences, Tarleton State University, Texas, USA

Other Disciplines

Dr. Aniruddha Belsare, Columbia MO 65203, USA (Veterinary)
Dr. Mandar S. Paingankar, University of Pune, Pune, Maharashtra, India (Molecular)
Dr. Jack Tordoff, Critical Ecosystem Partnership Fund, Arlington, USA (Communities)
Dr. Ulrike Streicher, University of Oregon, Eugene, USA (Veterinary)
Dr. Hari Balasubramanian, EcoAdvisors, Nova Scotia, Canada (Communities)
Dr. Rayanna Hellem Santos Bezerra, Universidade Federal de Sergipe, São Cristóvão, Brazil
Dr. Jamie R. Wood, Landcare Research, Canterbury, New Zealand
Dr. Wendy Collinson-Jonker, Endangered Wildlife Trust, Gauteng, South Africa
Dr. Rajeshkumar G. Jani, Anand Agricultural University, Anand, Gujarat, India
Dr. O.N. Tiwari, Senior Scientist, ICAR-Indian Agricultural Research Institute (IARI), New Delhi, India
Dr. L.D. Singla, Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana, India
Dr. Rupika S. Rajakaruna, University of Peradeniya, Peradeniya, Sri Lanka
Dr. Bahar Baviskar, Wild-CER, Nagpur, Maharashtra 440013, India

Reviewers 2018–2020

Due to pausity of space, the list of reviewers for 2018–2020 is available online.

The opinions expressed by the authors do not reflect the views of the Journal of Threatened Taxa, Wildlife Information Liaison Development Society, Zoo Outreach Organization, or any of the partners. The journal, the publisher, the host, and the partners are not responsible for the accuracy of the political boundaries shown in the maps by the authors.

Print copies of the Journal are available at cost. Write to:
The Managing Editor, JoTT,
c/o Wildlife Information Liaison Development Society,
No. 12, Thiruvannamalai Nagar, Saravanampatti - Kalapatti Road,
Saravanampatti, Coimbatore, Tamil Nadu 641035, India
ravi@threatenedtaxa.org

Journal of Threatened Taxa is indexed/abstracted in Bibliography of Systematic Mycology, Biological Abstracts, BIOSIS Previews, CAB Abstracts, EBSCO, Google Scholar, Index Copernicus, Index Fungorum, JournalSeek, National Academy of Agricultural Sciences, NewJour, OCLC WorldCat, SCOPUS, Stanford University Libraries, Virtual Library of Biology, Zoological Records.

NAAS rating (India) 5.64



OPEN ACCESS



The Journal of Threatened Taxa (JoTT) is dedicated to building evidence for conservation globally by publishing peer-reviewed articles online every month at a reasonably rapid rate at www.threatenedtaxa.org. All articles published in JoTT are registered under [Creative Commons Attribution 4.0 International License](https://creativecommons.org/licenses/by/4.0/) unless otherwise mentioned. JoTT allows unrestricted use, reproduction, and distribution of articles in any medium by providing adequate credit to the author(s) and the source of publication.

ISSN 0974-7907 (Online) | ISSN 0974-7893 (Print)

January 2022 | Vol. 14 | No. 1 | Pages: 20311–20538

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

DOI: 10.11609/jott.2022.14.1.20311-20538

www.threatenedtaxa.org

Articles

Estimating the completeness of orchid checklists and atlases: a case study from southern Italy

– Antonio Croce, Pp. 20311–20322

A floristic survey across three coniferous forests of Kashmir Himalaya, India – a checklist

– Ashaq Ahmad Dar, Akhtar Hussain Malik & Narayanaswamy Parthasarathy, Pp. 20323–20345

Associations of butterflies across different forest types in Uttarakhand, western Himalaya, India: implications for conservation planning

– Arun Pratap Singh, Pp. 20346–20370

Comparison of bird diversity in protected and non-protected wetlands of western lowland of Nepal

– Jagan Nath Adhikari, Janak Raj Khatiwada, Dipendra Adhikari, Suman Sapkota, Bishnu Prasad Bhattarai, Deepak Rijal & Lila Nath Sharma, Pp. 20371–20386

Local hunting practices and perceptions regarding the distribution and ecological role of the Large Flying Fox (Chiroptera: Pteropodidae: *Pteropus vampyrus*) in western Sarawak, Malaysian Borneo

– Jayasilan Mohd-Azlan, Joon Yee Yong, Nabila Norshuhadah Mohd Hazzrol, Philoveny Pengiran, Arianti Atong & Sheema Abdul Aziz, Pp. 20387–20399

Communications

Macrolichens of Mathikettan Shola National Park, Western Ghats: a preliminary investigation with some new records

– Aswathi Anilkumar, Stephen Sequeira, Arun Christy & S.M. Arsha, Pp. 20400–20405

New distribution record of globally threatened Ocean Turf Grass *Halophila beccarii* Ascherson, 1871 from the North Andaman Islands highlights the importance of seagrass exploratory surveys

– Swapnali Gole, Prasad Gaidhani, Srabani Bose, Anant Pande, Jeyaraj Antony Johnson & Kuppusamy Sivakumar, Pp. 20406–20412

An inventory of new orchid (Orchidaceae) records from Kozhikode, Kerala, India

– M. Sulaiman, C. Murugan & M.U. Sharief, Pp. 20413–20425

Abundance and spatial distribution analyses of *Stemonoporus moonii* Thwaites (Dipterocarpaceae) - a critically endangered species endemic to Sri Lanka

– K.A.M.R.P. Atapattu, H.D.D.C.K. Perera, H.S. Kathirachchi & A.R. Gunawardena, Pp. 20426–20432

Plant diversity of Point Calimere Wildlife Sanctuary and fodder species grazed by the Blackbuck *Antelope cervicapra* L.

– Ashutosh Kumar Upadhyay, A. Andrew Emmanuel, Ansa Sarah Varghese & D. Narasimhan, Pp. 20433–20443

Raptors observed (1983–2016) in National Chambal Gharial Sanctuary: semi-arid biogeographic region suggestions for parametric studies on ecological continuity in Khatiar-Gir Ecoregion, India

– L.A.K. Singh, R.K. Sharma & Udayan Rao Pawar, Pp. 20444–20460

Nesting success of Sharpe's Longclaw (*Macronyx sharpei* Jackson, 1904) around the grasslands of lake Ol'bolossat Nyandarua, Kenya

– Hamisi Ann Rispe, Charles M. Warui & Peter Njoroge, Pp. 20461–20468

Population, distribution and diet composition of Smooth-coated Otter *Lutrogale perspicillata* Geoffroy, 1826 in Hosur and Dharmapuri Forest Divisions, India

– Nagarajan Baskaran, Raman Sivaraj Sundarraj & Raveendranathanpillai Sanil, Pp. 20469–20477

Utilization of home garden crops by primates and current status of human-primate interface at Galigamuwa Divisional Secretariat Division in Kegalle District, Sri Lanka

– Charnalie Anuradhi Dona Nahallage, Dahanakge Ayesha Madushani Dasanayake, Dilan Thisaru Hewamanna & Dissanayakalage Tharaka Harshani Ananda, Pp. 20478–20487

Revival of Eastern Swamp Deer *Rucervus duvaucelii ranjitsinhi* (Groves, 1982) in Manas National Park of Assam, India

– Nazrul Islam, Aftab Ahmed, Rathin Barman, Sanatan Deka, Bhaskar Choudhury, Prasanta Kumar Saikia & Jyotishman Deka, Pp. 20488–20493

Trypanosoma evansi infection in a captive Indian Wolf *Canis lupus pallipes*

– molecular diagnosis and therapy

– Manojita Dash, Sarat Kumar Sahu, Santosh Kumar Gupta, Niranjana Sahoo & Debarat Mohapatra, Pp. 20494–20499

View Point

COVID-19 and civil unrest undoing steady gains in karst conservation and herpetological research in Myanmar, and an impediment to progress

– Evan S.H. Quah, Lee L. Grismer, Perry L. Wood, Jr., Aung Lin & Myint Kyaw Thura, Pp. 20500–20502

Short Communications

Morphological characterization and mt DNA barcode of a tiger moth species, *Asota fics* (Fabricius, 1775) (Lepidoptera: Noctuoidea: Erebiidae: Aganainae) from India

– Aparna Sureshchandra Kalawate, K.P. Dinesh & A. Shabnam, Pp. 20503–20510

Distribution of Smooth-coated Otters *Lutrogale perspicillata* (Mammalia: Carnivora: Mustelidae): in Ratnagiri, Maharashtra, India

– Swanand Patil & Kranti Yardi, Pp. 20511–20516

Wildlife at the crossroads: wild animal road kills due to vehicular collision on a mountainous highway in northwestern Himalayan region

– Muzaffar A. Kichloo, Asha Sohil & Neeraj Sharma, Pp. 20517–20522

Notes

***Robiquetia gracilis* (Lindl.) Garay—a new record to the flora of Anamalai Hills, Tamil Nadu, India**

– B. Subbaiyan, V. Ganesan, P.R. Nimal Kumar & S. Thangaraj Panneerselvam, Pp. 20523–20525

***Ipomoea laxiflora* H.J. Chowdhery & Debta (Convolvulaceae): new records for the Western Ghats and semiarid regions**

– Sachin M. Patil, Ajit M. Vasava, Vinay M. Raole & Kishore S. Rajput, Pp. 20526–20529

Counting the cost: high demand puts *Bunium persicum* (Boiss.) B.Fedtsch. in jeopardy

– Monika Sharma, Manisha Mathela, Rupali Sharma, Himanshu Bargali, Gurinderjit S. Goraya & Amit Kumar, Pp. 20530–20533

First record of Parasitic Jaeger *Stercorarius parasiticus* (Aves: Charadriiformes: Stercorariidae) from inland freshwater Inle Lake, Myanmar

– Sai Sein Lin Oo, Myint Kyaw, L.C.K. Yun, Min Zaw Tun, Yar Zar Lay Naung, Soe Naing Aye & Swen C. Renner, Pp. 20534–20536

Book Review

***Capparis* of India**

– V. Sampath Kumar, Pp. 20537–20538

Publisher & Host

