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Srivari Illam, No. 61, Karthik Nagar, 10th Street, Saravanampatti, Coimbatore, Tamil Nadu 641035, India  
Registered Office: 3A2 Varadarajulu Nagar, FCI Road, Ganapathy, Coimbatore, Tamil Nadu 641006, India  
Ph: +91 9385339863 | [www.threatenedtaxa.org](http://www.threatenedtaxa.org)  
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continued on the back inside cover

Cover: A bag worm with its beautiful heap of junk. Acrylics on 300 GSM paper by Dupati Poojitha based on a picture by Sanjay Molur.





During the present study, mature fruiting bodies of *B. pseudomilitaris* were collected on lepidopteran larva from Pachal, Ratnagiri District, Maharashtra, India. Morphological and microscopic identification was carried out. Isolation of *B. pseudomilitaris* into pure cultures, ITS rDNA identification, and evaluation of the phylogenetic relationship have been completed.

## MATERIAL AND METHODS

**a) Collection and morphological analysis:** The specimen was collected from Pachal, Ratnagiri District, Maharashtra, India on an unknown lepidopteran larva. Morphological studies and microscopic observations were conducted with a Lawrence and Mayo N-300M research microscope.

Status of the genus from India and the world: The genus *Blackwellomyces* has been recorded from different regions of the world – Brazil, Papua New Guinea, United States of America, Colombia, Thailand, Dominica, Cuba, Czechia, South Africa, Estonia, Ecuador, Puerto Rico, Japan, and Korea (GBIF.org 2024). There is no record of the genus *Blackwellomyces* from India until this study.

**b) Isolation:** Pure cultures were obtained on SDAY (Sabouraud Dextrose Agar with Yeast Extract), PDA, and PDA +chicken egg yolk. Before inoculation stromata were surface sterilized with 0.1% HgCl<sub>2</sub> (Table 1).

**c) DNA extraction, PCR amplification, and sequencing:** Pure cultures obtained were used for DNA extraction (Aamir et al. 2015); 30 mm colonies were crushed with liquid nitrogen and the powder was treated with 1 ml lysis buffer (100 mM Tris HCl [pH 8.0], 50 mM EDTA, 3% SDS). Shaking was done by inverting the tube and centrifuging at 10,000 rpm for 10 minutes. The supernatant was taken in a new Eppendorf tube and an equal volume of phenol: chloroform: isoamyl alcohol (25:24:1) (PCI) was added and centrifuged at 10,000 rpm for 10 minutes. The aqueous layer was separated in a new Eppendorf tube and an equal volume of Chloroform: Isoamyl alcohol (24:1) (CI) was added and centrifuged at 10,000 rpm for 10 minutes. The upper aqueous layer was separated in a new Eppendorf tube and an equal

volume of 100% ethanol was added. It was kept at -20 °C for 20 minutes and centrifuged at 10,000 rpm for 10 minutes at 4 °C. The pellet was washed with 500 µL 70% ethanol and centrifuged at 10,000 rpm for 5 minutes at 4 °C. The pellet was dissolved in an elution buffer. 2 µL DNA was subjected to 0.6% agarose gel electrophoresis. It was observed under a gel documentation system and quantity was measured by nano-300 micro-spectrophotometer. For PCR and sequencing of DNA, the samples were sent to PEON laboratories, Kolhapur, India. Sequence was edited by BioEdit 7.2 software and Phylogram was obtained with MEGA 11 software.

## RESULTS AND DISCUSSION

Stromata 25–65 mm long and up to 1–5 mm wide, solitary, unbranched or branched arising directly from the head of the Lepidopteran larva. Stipe 10–35 mm long & 1–3 mm wide fleshy, brittle, flexible, solid, yellow to orange towards apex; whitish-cream towards the base. Stroma 12–25 mm long and 1–3 mm wide, cylindrical, often flattened, with blunt apex, yellow to orange, often bright orange towards apex. Perithecia superficial, immersed in the base, apex prominent, elongated-ellipsoid or elongate-ovoid, 289–574 × 122–241 µm with hyaline walls. Unitunicate ascus with ascus cap; asci 210–395 × 5–6 µm; eight ascospores not breaking into part-spores (Image 1a–f).

**Collection examined:** India, Maharashtra, District Ratnagiri, Tehsil Rajapur, Pachal (16.7038 °N, 73.7211 °E), on larvae buried in soil, 11 August 2022; Snehal Biranje & Yogesh Patil.

## Remarks

*Blackwellomyces pseudomilitaris* was collected on Lepidopteran larva covered by hyphae around the dead diseased larvae that gathered into a loose network of rhizomorph like structures. *C. pseudomilitaris* was discovered from in the deciduous monsoon forest of Sam Lan National Park, Thailand. The species looked similar to *C. militaris* but on the basis of some distinguishing morphological characters, it was described as *C.*

**Table 1.** Isolation of *Blackwellomyces pseudomilitaris* on different media.

Name of medium	Granulated PDA	Dextrose	Peptone	Agar type I	Yeast extract	Magnesium sulphate	Egg yolk (Chicken)
SDAY	-	20 g/L	5 g/L	15 g/L	5 g/L	0.3 g/L	-
PDA	39 g/L	-	-	-	-	0.3 g/L	-
PDA + egg yolk	39 g/L	-	-	-	-	0.3 g/L	25 ml

SDAY—Sabouraud dextrose agar with yeast extract | PDA—Potato dextrose agar | PDA + egg yolk—Potato dextrose agar + egg yolk.

*pseudomilitaris*. The ground-dwelling host lepidopteran larvae were often found 2–5 cm below the soil surface. The hyphae around the dead, diseased larvae gathered into a loose network of rhizomorph-like structures that encircled the caterpillar. These structures developed independently throughout the soil, periodically coming together and then splitting apart once more, until combining to create the stroma at the surface (Hywel-Jones 1994), stromata 12–25 mm long, rhizomorphs present, ascospores do not split into part-spores and asci  $210\text{--}395 \times 5\text{--}6 \mu\text{m}$  (Catania et al. 2018). The collections from the present specimen shows similarities to it with respect to morphological characteristics. *C. militaris* has been more frequently found on pupae of lepidopterans than the larvae. However, some researchers noted that *C. pseudomilitaris* was found only on the larvae (Mains 1958; Hywel-Jones 1994). *C. militaris* is usually found on pupae of many distinct families of moths. Contemporary molecular data also argues that *C. pseudomilitaris* distinct from *Cordyceps militaris* (Artjariyasriping et al. 2001). The microscopic characteristics of the non-disarticulating ascospore and host preference for lepidopteran larva of *C. pseudomilitaris* contrasts with the characteristics of *C. militaris* but resemble *C. cardinalis* (Sung & Spatafora 2004). The distinctive characteristics such as ascospores with irregularly spaced septa and non-disarticulating part-spores are used to identify *Blackwellomyces*. Two combinations are made in the genus *Blackwellomyces* i.e., *B. cardinalis* and *B. pseudomilitaris* (Kepler et al. 2017).

### Cultural characteristics

The pure colonies isolated on PDA and SDA are circular, white, umbonate with irregular margin and formed within two days of inoculation and achieving 20–30 mm diameter, release red pigmentation in the medium similar growth observed on PDA + egg but faster than PDA and SDA (Image 1: g–l).

Previously some workers isolated *B. pseudomilitaris* into pure culture on PDA and MCM (Mushroom complete medium) which produced red pigments in two conditions, shaking and static (Sutthisa & Sanoamuang 2014). The production of reddish pigments diffusing in the agar medium and it can be used to identify species such as *B. aurantiacus*, *B. roseostromatus*, and *B. cardinalis*. *B. calendulinus*, *B. minutus*, and *B. pseudomilitaris* do not produce reddish pigments in agar medium (Mongkolsamrit et al. 2020). In the present study, there is secretion of red pigment by *B. pseudomilitaris* into the medium.

### Phylogenetic analysis

Morphologically the present specimen shows similarities to *Cordyceps militaris* with some minor differences. The cultures released a red pigment in the medium. The 564 bp sequence obtained was deposited in the GenBank at the National Center for Biotechnology Information (NCBI) with Accession no. OR259389. GenBank BLAST search sequence showed 98.57% similarity with *Blackwellomyces pseudomilitaris* (MT000700) and 98.55 % similarity with *Cordyceps*



Figure 1. Collections of the genus *Blackwellomyces* from around the world (© GBIF | Global Biodiversity Information Facility).

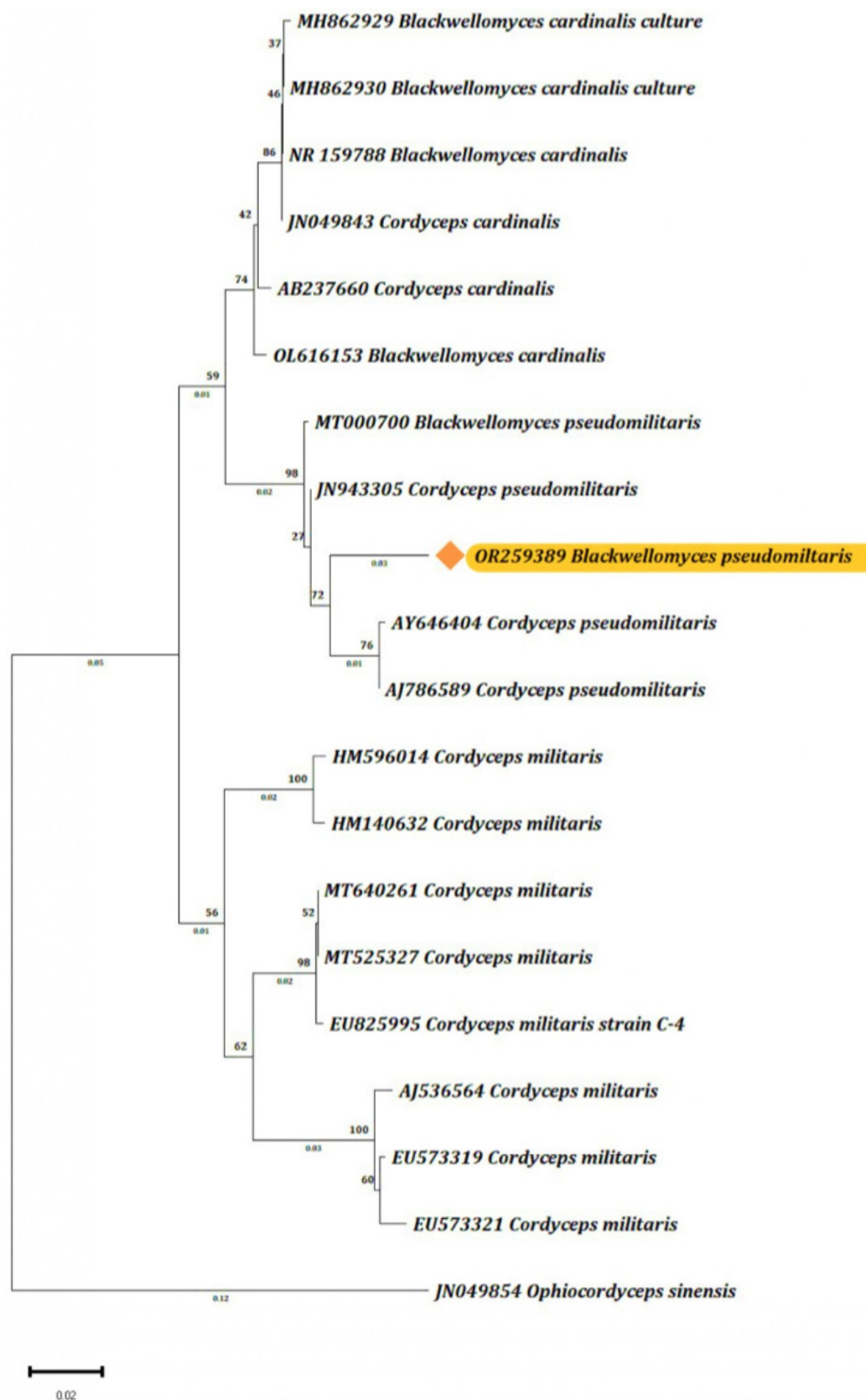


Figure 2. Phylogenetic tree of *Blackwellomyces pseudomilitaris* and other *Cordyceps* species based on rDNA internal transcribed spacer (ITS) sequences with neighbor-joining method with Kimura 2-parameter model with rapid bootstrapping algorithm of 100 replicate and *Ophiocordyceps sinensis* used as an outgroup.



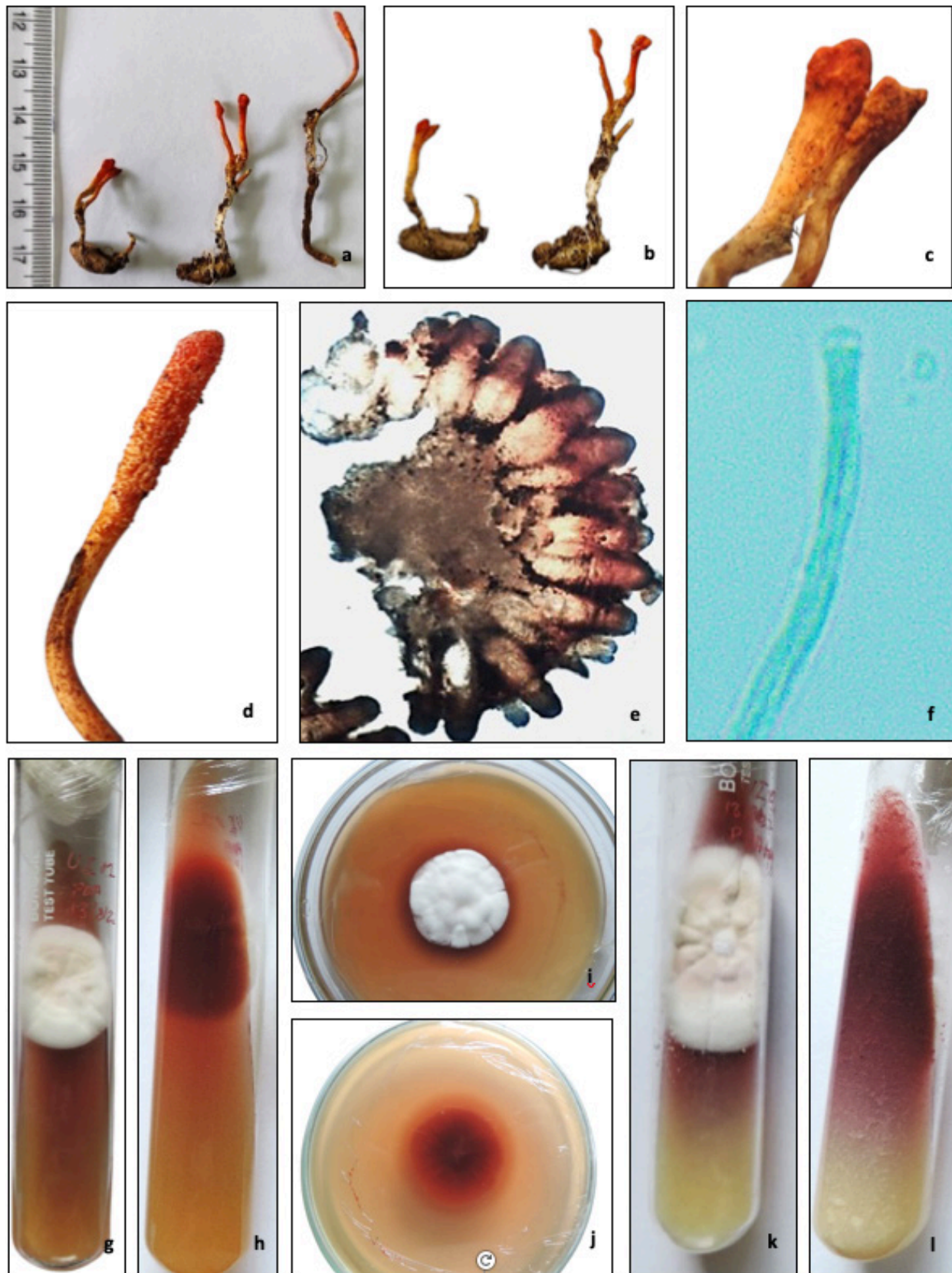


Image 1. *Blackwellomyces pseudomilitaris* (Hywel-Jones & Sivichai) Spatafora & Luangsa-ard: a–b—Habit | c–d—Stromata with semi superficial perithecia | e—Perithecia 10X | f—Ascus 100X | g–h—Pure cultures growing on PDA | i–j—Pure cultures growing on SDAY | k–l—Pure cultures growing on PDA+ egg. © Snehal Biranje.

*pseudomilitaris* (JN943305). For phylogenetic analysis, all available ITS rDNA sequences of reference such as *B. pseudomilitaris*, *B. cardinalis*, and *Cordyceps militaris* were retrieved from GenBank. *B. pseudomilitaris* (MT000700) and *C. pseudomilitaris* (JN943305) show maximum match which indicates that the isolated strain is *Blackwellomyces pseudomilitaris*. All retrieved sequences were aligned using the MEGA11 program. Phylogenetic tree was constructed using the neighbor-joining method with Kimura 2-parameter model in MEGA11 software. Bootstrap analysis was performed with 100 replications to determine and support the match (Figure 2).

Microscopic, cultural, and molecular data clearly indicate that *C. militaris* and *B. pseudomilitaris* are phylogenetically separate species. The present collection shows affinity towards *B. pseudomilitaris*. Thus, this makes a new record to the fungi of India. As it shares a close relation to *Cordyceps militaris* which is one of the important medicinal fungus, further studies will result in exploring the medicinal potential of the present specimen.

### Conclusion and future prospective

*B. pseudomilitaris* is recorded for the first time from India. This species has been only reported from Thailand. It clearly indicates that, it is an extremely rare species. Morphology, microscopy, cultural studies, and ITS rDNA sequencing confirms the identity of the species.

Even though *C. militaris* and *C. cardinalis* show morphological similarity the molecular sequence shows the highest similarity with *B. pseudomilitaris*. Further biochemical characterization of cultures will lead to knowledge about its biological potential.

### REFERENCES

- Aamir, S., S. Sutar, S.K. Singh & A.A. Baghela (2015). Rapid and efficient method of fungal genomic DNA extraction, suitable for PCR-based molecular methods. *Plant Pathology and Quarantin* 5: 74–81. <https://doi.org/10.5943/ppq/5/2/6>
- Artjariyasriping, S., J.I. Mitchell, N.L. Hywel-Jones & E.B. Gareth-Jones (2001). Relationship of the genus *Cordyceps* and related genera based on parsimony and spectral analysis of partial 18S and 28S ribosomal gene sequences. *Mycoscience* 42: 503–517. <https://doi.org/10.1007/BF02460949>
- Catania, M.D.V., T.I. Sanjuan & G.L. Robledo (2018). South American *Cordyceps* s. l. (Hypocreales, Ascomycota): First assessment of species diversity in Argentina. *Nova Hedwigia* 106: 261–281. [https://doi.org/10.1127/nova\\_hedwigia/2017/0434](https://doi.org/10.1127/nova_hedwigia/2017/0434)
- Das, G., H.S. Shin, G. Leyva-Gómez, M.L.D. Prado-Audelo, H. Cortes, Y.D. Singh, M.K. Panda, A.P. Mishra, M. Nigam, S. Saklani, P.K. Chaturi, M. Martorell, N. Cruz-Martins, V. Sharma, N. Garg, R. Sharma & J.K. Patra (2021). *Cordyceps* spp.: A Review on Its Immune-Stimulatory and other Biological Potentials. *Frontiers Pharmacology* 11: 602364. <https://doi.org/10.3389/fphar.2020.602364>
- Hywel-Jones, N. (1994). *Cordyceps khaoyaiensis* and *C. pseudomilitaris*, two new pathogens of lepidopteran larvae from Thailand. *Mycological Research* 98: 939–942. [https://doi.org/10.1016/S0953-7562\(09\)80267-0](https://doi.org/10.1016/S0953-7562(09)80267-0)
- Isaka, M., M. Tanticharoen & Y. Thebtaranonth (1999). Cordyanhydrides A and B. Two unique anhydrides from the insect pathogenic fungus *Cordyceps pseudomilitaris* BCC 1620. *Tetrahedron Letters* 41: 1657–1660. [https://doi.org/10.1016/S0040-4039\(00\)00008-3](https://doi.org/10.1016/S0040-4039(00)00008-3)
- Kepler, R.M., J.J. Luangsa-Ard, N.L. Hywel-Jones, C.A. Quandt, G.H. Sung, S.A. Rehner, M.C. Aime, T.W. Henkel, T. Sanjuan, R. Zare, M. Chen, Z. Li, A.Y. Rossman, J.W. Spatafora & B.A. Shrestha (2017). Phylogenetically based nomenclature for Cordycipitaceae (Hypocreales). *IMA Fungus* 8(2): 335–353.
- Mains, E.B. (1958). North American entomogenous species of *Cordyceps*. *Mycologia* 50: 169–222. <https://doi.org/10.2307/3756193>
- Manoharachary, C.N.S., T. Atri, P. Devi, D. Kamil, S.K. Singh & A.P. Singh (2022). *Bilgrami's Fungi of India List and References* (1988–2020). Today & Tomorrow's Printers and Publishers, 500 pp.
- Mongkolsamrit, S., W. Noisripoom, K. Tasanathai, A. Khonsanit, D. Thanakitpipattana, W. Himaman, N. Kobmoo & J.J. Luangsa-ard (2020). Molecular phylogeny and morphology reveal cryptic species in *Blackwellomyces* and *Cordyceps* (Cordycipitaceae) from Thailand. *Mycological Progress* 19(9): 957–983. <https://doi.org/10.1007/s11557-020-01615-2>
- Pande, A. (2008). *Ascomycetes of Peninsular India*. Scientific Publisher India, 584 pp.
- Sung, G.H. & J.W. Spatafora (2004). *Cordyceps cardinalis* sp. nov., a New Species of *Cordyceps* with an East Asian-Eastern North American Distribution. *Mycologia* 96: 658–666. <https://doi.org/10.1080/15572536.2005.11832962>
- Sutthisa, W. & N. Sanoamuang (2014). Study of chemical compositions of *Cordyceps pseudomilitaris* pigments by gas chromatography–mass spectrometry (GC-MS). *International Journal of Agricultural Technology* 10: 583–593.
- www.GBIF.org (2024). *Blackwellomyces* Spatafora & Luangsa-ard, 2017 in GBIF Secretariat (2023). GBIF Backbone Taxonomy. Checklist dataset <https://doi.org/10.15468/39omei> Electronic version accessed 30 December 2024.
- Zha, L.S., S.K. Huang, Y.P. Xiao, S. Boonmee, P.D. Eungwanichayapant, C. McKenzie, V. Kryukov, X.L. Wu, K.D. Hyde & T.C. Wen (2018). An evaluation of common *Cordyceps* (Ascomycetes) species found in Chinese markets. *International Journal of Medicinal Mushrooms* 20(12): 1149–1162. <https://doi.org/10.1615/IntJMedMushrooms.2018027330>



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Dr. Priyadarsanan Dharma Rajan, Ashoka Trust for Research in Ecology and the Environment (ATREE), Royal Enclave, Bangalore, Karnataka, India

Fishes

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Dr. Heok Hee Ng, National University of Singapore, Science Drive, Singapore  
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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

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Reptiles

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Birds

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Dr. Grant Connette, Smithsonian Institution, Royal, VA, USA  
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Mammals

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Dr. Justus Joshua, Green Future Foundation, Tiruchirappalli, Tamil Nadu, India  
Dr. H. Raghuram, The American College, Madurai, Tamil Nadu, India  
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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)  
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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

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Tamil Nadu 641006, India  
ravi@threatenedtaxa.org & ravi@zooreach.org

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#### Articles

***Dasyaschalon leilamericanum* (Annonaceae), a new species with evidence of non-monophyly from Mount Lantoy Key Biodiversity Area, Philippines**  
– Raamah Rosales, Edgardo Lillo, Archiebald Baltazar Malaki, Steve Michael Alcazar, Bernardo Redoblado, John Lou Diaz, Inocencio Buot Jr., Richard Parilla & Jessica Rey, Pp. 26571–26586

**Association analysis of *Castanopsis tungurur* and the neighboring vegetation community in Cibodas Biosphere Reserve, Indonesia**  
– Dian Ridwan Nurdiana & Inocencio E. Buot, Jr., Pp. 26587–26598

**Riparian flora of Haveri District, Karnataka, India**  
– Ningaraj S. Makanur & K. Kotresha, Pp. 26599–26615

**Conservation strategies for *Vatica lanceifolia* (Roxb.) Blume: habitat distribution modelling and reintroduction in northeastern India**  
– Puranjoy Mipun, Amritee Bora, Piyush Kumar Mishra, Baby Doley & Rinku Moni Kalita, Pp. 26616–26626

**Patterns and economic impact of livestock predation by large carnivores in protected areas of southern Kashmir, India**  
– Lubna Rashid & Bilal A. Bhat, Pp. 26627–26635

**People perception on use patterns and conservation of Chinese Pangolin in and around Yangoupokpi Lokchao Wildlife Sanctuary, Manipur, India**  
– Yengkhom Roamer Zest, Awadhesh Kumar, Om Prakash Tripathi, Rakesh Basnett & Dipika Parbo, Pp. 26636–26647

#### Communications

**Population status, threats, and conservation of *Trachycarpus takil*: an endemic and threatened plant species in western Himalaya, India**  
– Himani Tiwari, Dhani Arya & K. Chandra Sekar, Pp. 26648–26654

**A checklist of fishes of Haiderpur wetland, western Uttar Pradesh, India**  
– Rahul Rana, Jeyaraj Antony Johnson & Syed Ainul Hussain, Pp. 26655–26668

**An avifaunal checklist of the Zaskar Region, Ladakh Himalaya, India**  
– Abid Hussain, Zakir Hussain & Mumtaz Ali, Pp. 26669–26679

**Breeding tern colonies on the sandbars of Adam's Bridge, India: new records and significance**  
– H. Byju, H. Maitreyi, N. Raveendran, D.A. Marshal & S. Ravichandran, Pp. 26680–26689

**Assessment of nest and nesting activities of White-bellied Heron *Ardea insignis* Hume, 1878 (Aves: Ardeidae) in the broad-leaved forests of northeastern India**  
– Himadri Sekhar Mondal & Gopinathan Maheswaran, Pp. 26690–26696

**Preliminary checklist of avifauna from All India Institute of Medical Sciences, Guwahati, Assam, India**  
– Nitul Ali, Vivek Chetry, Prem Kishan Singha & Maina Boro, Pp. 26697–26703

**Implementation strategy and performance analysis of a novel ground vibration-based elephant deterrent system**  
– Sanjoy Deb, Ramkumar Ravindran & Saravana Kumar Radhakrishnan, Pp. 26704–26714

#### Short Communications

***Blackwellomyces pseudomilitaris* (Hywel-Jones & Sivichai) Spatafora & Luangsa-ard, 2017 (Sordariomycetes: Hypocreales: Cordycipitaceae): first report from Western Ghats of India**  
– Anjali Rajendra Patil, Snehal Sudhir Biranje, Mahesh Yashwant Borde & Yogesh Sadashiv Patil, Pp. 26715–26720

***Calvatia craniiformis* (Schwein.) Fr. ex De Toni (Agaricomycetes: Lycoperdaceae): a new puffball mushroom record from eastern India**  
– Asit Mahato, Pritish Mitra, Sabyasachi Chatterjee & Subrata Raha, Pp. 26721–26726

**Rediscovery of the gypsy moth *Lymantria kanara* Collenette, 1951 (Insecta: Lepidoptera: Erebidæ) from Kerala, India, after 73 years and its taxonomic redescription**  
– P.K. Adarsh & Abhilash Peter, Pp. 26727–26730

**Nest predation by *Vespa tropica* (Linnaeus, 1758): observational insights into polistine wasp defense and hornet feeding behavior**  
– Shantam Ojha & Vartika Negi, Pp. 26731–26736

**The discovery of a male Malay Crestless Fireback *Lophura erythrophthalma* (Raffles, 1822) (Aves: Galliformes: Phasianidae) at Ulu Sat Forest Reserve, Machang, Kelantan, Peninsular Malaysia**  
– Ainun Hidayah Wahad, Wan Hafiz Idzni Wan Mohammad Hizam, Muhammad Hamirul Shah Ab Razak, Aainaa Amir, Kamarul Hambali, Hazizi Husain, Mohd Saupi Abdullah, Ehwan Ngadi, Mohamad Arif Iskandar Abdul Wahab & Asrulsani Jambari, Pp. 26737–26740

#### Notes

**New distribution record of *Korthalsia rogersii* Becc, a threatened endemic climbing palm of Andaman archipelago**  
– Paremmal Sarath, Azhar Ali Ashraf, V.B. Sreekumar, Modhumita Ghosh Dasgupta & Suma Arun Dev, Pp. 26741–26743

**Clarifying the nomenclature of Roxburgh's pivotal name *Holigarna racemosa* Roxb. (Anacardiaceae)**  
– Shruti Kasana, Pp. 26744–26746

**First confirmed breeding of Brown Noddy *Anous stolidus* in southeastern India: a new record from Adam's Bridge**  
– H. Byju, H. Maitreyi, N. Raveendran & D.A. Marshal, Pp. 26747–26749

**First record of Painted Stork *Mycteria leucocephala* in Indonesia**  
– Hasri Abdillah, Iwan Febrianto, Cipto Dwi Handono, Fajar Shiddiq, Febryansah Abdillah Harahap & Muhammad Iqbal, Pp. 26750–26752

**New sighting and conservation implications of the endemic Sulu Boobook *Ninox reyi* Oustalet, 1880 at Bolobok Rock Shelter, a key archaeological site in the Sulu Archipelago, southern Philippines**  
– Fauriza J. Saddari, Yennyryza T. Abduraup, Adzmer A. Juaini, Roger A. Irilis, Khalid D. Adam, Mary Joyce Z. Guinto-Sali & Richard N. Muallil, Pp. 26753–26756

**The occurrence of Glossy Ibis *Plegadis falcinellus* Linnaeus, 1766 (Pelecaniformes: Threskiornithidae) in southern Sumatra, Indonesia**  
– Muhammad Iqbal, Arum Setiawan, Putri Balqis, Exaudi Beatrice Simanullang, Pormansyah, Selamat Robinsa, Winda Indriati & Indra Yustian, Pp. 26757–26760

#### Book Review

**A whisper of silken wings**  
– Aparna Sureshchandra Kalawate & Pooja Kumar Misal, Pp. 26761–26762

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