

Building evidence for conservation globally

Journal of Threatened TAXA



10.11609/jott.2024.16.12.26187-26330

www.threatenedtaxa.org

26 December 2024 (Online & Print)

16(12): 26187-26330

ISSN 0974-7907 (Online)

ISSN 0974-7893 (Print)

Open Access





Publisher

Wildlife Information Liaison Development Societywww.wild.zooreach.org

Host

Zoo Outreach Organizationwww.zooreach.org

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

Email: sanjay@threatenedtaxa.org

EDITORS

Founder & Chief Editor

Dr. Sanjay Molur

Wildlife Information Liaison Development (WILD) Society & Zoo Outreach Organization (ZOO), Coimbatore, Tamil Nadu 641006, India

Deputy Chief Editor

Dr. Neelesh Dahanukar

Noida, Uttar Pradesh, India

Assistant Editor

Dr. Chaithra Shree J., WILD/ZOO, Coimbatore, Tamil Nadu 641006, 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

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. 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. Sindhu 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 2021–2023

Fungi

Dr. B. Shivaraju, Bengaluru, Karnataka, India

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

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

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

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

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

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. Ferdinand 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, Anantapur, 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 Ranjan Housing Society, Pune, Maharashtra, India

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

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

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

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

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

Dr. P. Lakshminarasiham, 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. Siru, Central University of Kerala, Kasaragod, Kerala, India

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

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

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

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

Dr. A.G. Pandurangan, Thiruvananthapuram, Kerala, India

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

Dr. Kannan C.S. Warrier, Institute of Forest Genetics and Tree Breeding, Tamil Nadu, India

Invertebrates

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

Dr. D.B. Bastawade, Maharashtra, India

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

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

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

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

Dr. Brian Fisher, California Academy of Sciences, USA

Dr. Richard Gallon, 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_scopeFor Article Submission Guidelines, visit <https://threatenedtaxa.org/index.php/JoTT/about/submissions>For Policies against Scientific Misconduct, visit https://threatenedtaxa.org/index.php/JoTT/policies_various

continued on the back inside cover

Cover: Life and death in one night - wolf hunting the hare. Mixed media—gouache, acrylics, pen & colour pencils. © Dupati Poojitha.



SHORT COMMUNICATION

New record of *Sapria himalayana* Griff. (Rafflesiaceae) from Eaglenest Wildlife Sanctuary, Arunachal Pradesh, India

Anisha Mandal¹ , Aman Bishwakarma² , Dibi Soma Monpa³ , Kabir Pradhan⁴ , Karma Wangdi Monpa⁵ & Rohit Rai⁶

^{1,2,4,6} Centre for Ecological Sciences, Indian Institute of Science, Bengaluru, Karnataka 560012, India.

^{3,5} Eaglenest Wildlife Sanctuary, Shergaon Forest Division, Rupa, Arunachal Pradesh 790003, India.

¹ anishamandal@iisc.ac.in (corresponding author), ² bkaman653@gmail.com, ³ monpadibisoma@gmail.com ⁴ kp317815@gmail.com,

⁵ monpakkarmawangdi@gmail.com, ⁶ rairohit1667@gmail.com

Abstract: The eastern Himalayan region is renowned for its exceptional and abundant floral and faunal biodiversity, harbouring numerous endemic plant species. Among them, *Sapria himalayana* Griffith, an endoparasitic, rare, and endangered plant, was first discovered in the Mishmi Hills of Arunachal Pradesh in 1836. Despite its discovery nearly two centuries ago, the species remains poorly understood. While some recent studies have begun to explore the genetics and demography of this species, there is still a significant knowledge gap in the understanding of the life history patterns of this parasitic plant. Here, a new record has been added to the distribution of *Sapria himalayana* from Eaglenest Wildlife Sanctuary, West Kameng District, Arunachal Pradesh. Around 21 flowers were scattered on the forest floor, spanning various developmental stages from buds to flower maturation, including desiccated flowers. The bud emerges from the roots of *Tetrastigma* sp. (host plant). One of the primary challenges in conducting extensive research on the intriguing Himalayan *Sapria* is its infrequent and unpredictable flowering patterns. Therefore, understanding these aspects (flowering phenology and enigmatic traits) is crucial for further research and preserving this rare species and its hosts in the face of ongoing habitat loss. Conducting an annual plant survey in the Eaglenest Wildlife Sanctuary can help identify patterns to unravel these mysteries.

Keywords: Distribution, endangered, endoparasitic, flowering phenology, host plant, Himalayan region, *Tetrastigma* sp.

Sapria himalayana Griffith., (Rafflesiaceae) is a rare and endangered flowering plant (Nayar & Sastry 1987). All three genera of the Rafflesiaceae family are endoparasites, thriving within their grapevine (Vitaceae) hosts (Nikolov et al. 2014). *Sapria* and its two sister clades, *Rhizanthes* and *Rafflesia*, have lost the genes required for photosynthesis and rely entirely on obligate host species for sustenance (Osathanunkul 2019). Unusually, these parasitic angiosperms do not have an external vegetative body, only the solitary flower bud, which emerges from the host's roots and matures to a unisexual flower for brief periods to complete the life cycle. The hosts of *S. himalayana* include various *Tetrastigma* vines (*T. obovatum*, *T. cruciatum*, *T. laoticum*, *T. bracteolatum*, and *T. serrulatum*) recorded from Thailand and northeastern India (Elliott 1990; Arunachalam et al. 2004).

The genus *Sapria* has four species (Dorji et al. 2022). Among them, only *S. himalayana* has a wide distribution, and the other three species, *S. poilanei* Gagnep., *S. ram* Bänziger & B. Hansen., and *S. myanmarensis* (Tanaka et al. 2019) are endemic and have small ranges. *S. poilanei* is endemic to Cambodia, *S. ram* is endemic to

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

Date of publication: 26 December 2024 (online & print)

Citation: Mandal, A., A. Bishwakarma, D.S. Monpa, K. Pradhan, K.W. Monpa & R. Rai (2024). New record of *Sapria himalayana* Griff. (Rafflesiaceae) from Eaglenest Wildlife Sanctuary, Arunachal Pradesh, India. *Journal of Threatened Taxa* 16(12): 26301-26305. <https://doi.org/10.11609/jott.9115.16.12.26301-26305>

Copyright: © Mandal et al. 2024. Creative Commons Attribution 4.0 International License. JoTT allows unrestricted use, reproduction, and distribution of this article in any medium by providing adequate credit to the author(s) and the source of publication.

Funding: Department of Biotechnology (DBT) and Science and Engineering Research Board (SERB).

Competing interests: The authors declare no competing interests.



Acknowledgements: We thank Dr. Umesh Srinivasan for his continued assistance and guidance, and Dr. R. Ganeshan for his suggestions in species identification. We thank the Arunachal Pradesh Forest Department and the Shergaon Forest Division for their support of this project and for providing us with permits. We wish to acknowledge complete gratitude to the Department of Biotechnology (DBT) and Science and Engineering Research Board (SERB) for finance assistance.

Thailand, and the recently discovered *S. myanmarensis* is endemic to Myanmar (Bänziger et al. 2000; Holden 2010; Tanaka et al. 2019). The Himalayan Sapria was first described by the British botanist William Griffith in 1844, which was discovered by him in 1836 from the Mishmi Hills of Arunachal Pradesh, India (Griffith 1844; Dorji et al. 2022). After its discovery, it has been reported only a few times from other regions of northeastern India (Borah & Ghosh 2018; Ahmad et al. 2020; Devi et al. 2022; Singh et al. 2022; Syiemiong et al. 2022). Its distribution range includes Bhutan, northeastern India, Tibet, south-central China, Myanmar, Thailand, and Vietnam (Dorji et al. 2022). The flower of *S. himalayana* is unique and exceptionally beautiful. It is velvety and has 10 distinct perigone lobes. The flower emits a putrid odour. Previous studies have reported that the release of the foul odour attracts insect pollinators that pollinate the dioecious flower (Bänziger 2004; Davis et al. 2008). Very few studies have documented fruiting; fruits are black, 3.1–5 cm long, with a low fruiting rate (Bänziger 2004). The seeds are blackish-brown and 0.6–0.65 mm long, and rodents perform seed dispersal (Bänziger 2004; Borah & Ghosh 2018).

Even though it was discovered almost two centuries

ago, the comprehensive knowledge of Himalayan Sapria is still lacking. Here, a new record of *Sapria himalayana* from Eaglenest Wildlife Sanctuary, West Kameng District, Arunachal Pradesh is documented (Image 1). A previous study from 1938 documents the flower's presence from the same district in Aka Hills, near Rupa (Bor 1938; Dorji et al. 2022). That was the second-ever recorded instance of this wildflower. Following an 85-year interval, another record is now documented in this region. Eaglenest Wildlife Sanctuary (WS) is located in the West Kameng District of Arunachal Pradesh, India. Being a part of the Eastern Himalaya Global Biodiversity Hotspot, Eaglenest WS harbours diverse plant species. The WS covers an area of 217 km² with an elevation gradient ranging 500–3,300 m. Annual precipitation ranges from roughly 1,500 mm to over 3,000 mm (Mohan & Athreya 2011). The elevation gradient shapes diverse forest ecosystems, transitioning from tropical wet evergreen forest at lower elevations (below 1,000 m) to broadleaved subtropical (between 800–2,000 m), temperate forest at higher elevations (between 1,800–2,800 m), and above 2,800 m, temperate coniferous forest. The elevation gradient hosts various plant species, contributing significantly to the region's rich floral biodiversity. The critically

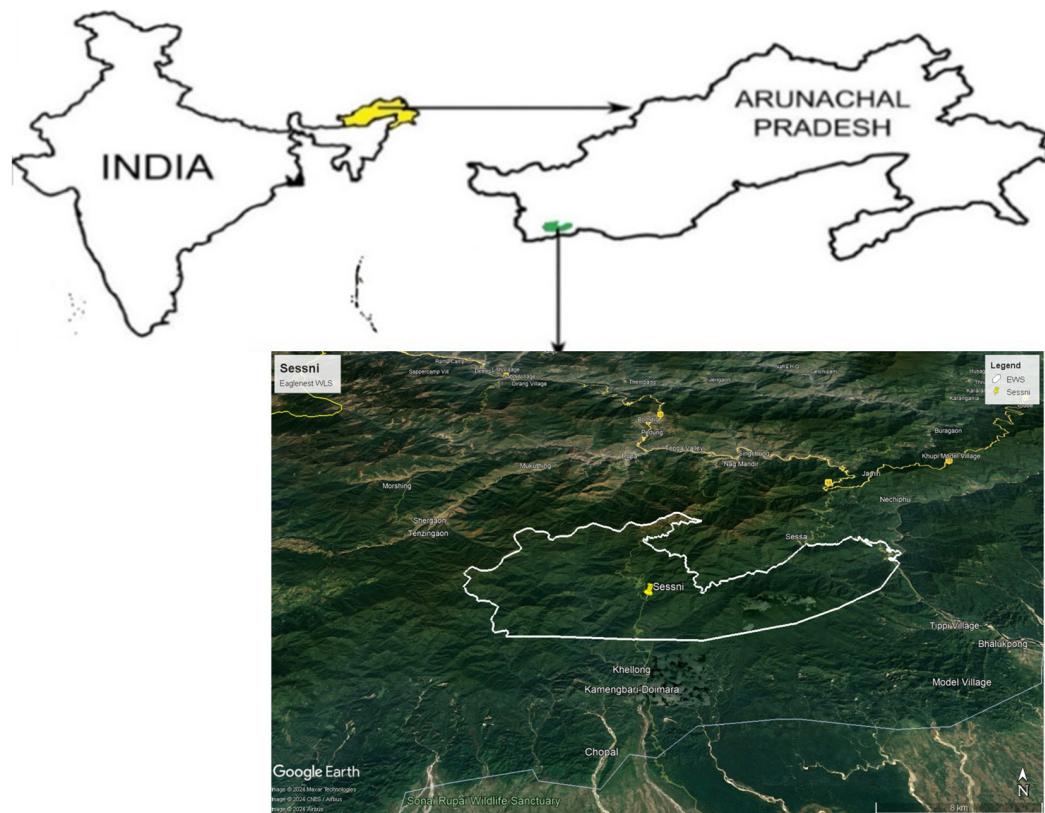


Image 1. The map shows the location of Sessni inside Eaglenest Wildlife Sanctuary, Arunachal Pradesh, India.



Image 2. A bud of *Sapria himalayana* on the forest floor emerging from the host's root.



Image 3. An individual flower of *Sapria himalayana* Griff. in its natural habitat.



Image 4. A naturally aborted *Sapria himalayana* bud beside a healthy bud.



Image 5. A decaying flower of *Sapria himalayana*.



Image 6. A *Sapria himalayana* flower with 12 perigone lobes.



Image 7. Measurements of the *Sapria himalayana* flower's diameter.



Image 8. Measurements of a *Sapria himalayana* mature bud.

endangered *Gymnocladus assamicus* and valuable medicinal plants like *Paris polyphylla* are found at higher altitudes. The dominant woody trees at lower elevations include *Magnolia hodgsonii*, *Ficus* spp., *Canarium resiniferum*, *Pinus roxburghii*, *Castanopsis hystrix*, *Gynocardia odorata*, etc. Additionally, the understorey is dominated by *Elatostema platyphyllum*, *Strobilanthes hamiltoniana*, *Trivalvaria* sp., and *Achyrospermum wallichianum*.

In December 2023, five globose buds were encountered on the forest floor while walking along a trail in the primary forest. Following this initial observation, a systematic investigation was undertaken at the exact site on the next day. Each individual blooming flower was counted and the dimensions were measured (diameter and height) of flowers and buds. Each floral development stage was documented, including fresh buds, aborted flower buds, mature fresh flowers, and decaying flowers.

Accurate geographical coordinates and elevation data were captured using a GPS tracking device for precise locational mapping. Given that the species is IUNC Endangered, the exact coordinates of this record are not shared. Host plants associated with the parasitic flowers were photographed for later taxonomic identification. Subsequent identification of both the parasitic flower and its host plants was carried out using scientific literature and botanical resources.

The *S. himalayana* individuals were discovered near the Sessni camp of Eaglenest WS. Around 21 individuals spanning various developmental stages were observed, from bud emergence to flower maturation, including naturally decaying buds and decaying flowers (Image 2–5). The buds cluster in groups of three or five, scattered across the forest floor. Most flowers grew on gentle

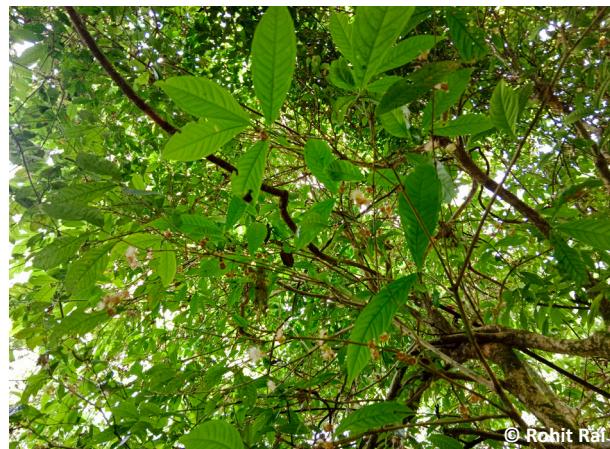


Image 9. The host plant of *Sapria himalayana*, i.e., *Tetrastigma* sp. of Vitaceae.

slopes, but some were found on level ground. A nearby water stream may fulfil the specific habitat requirements of this species. The flowers of *S. himalayana* are vibrant red, with sulphur-yellow dots on their perigone lobes. Most of the flowers have 10 perigone lobes in count. An individual *S. himalayana* flower with 12 perigone lobes (Image 6) is also recorded, contrasting with past published literature indicating the flower typically exhibits 10 perigone lobes. The flower was roughly 20 cm (Image 7) in diameter and about 12 cm tall. A mature bud was 12 cm wide (Image 8). The flower emits putrid smells that can be detectable from a few meters away. The vegetative parts of *S. himalayana* grow inside the host's lianas of *Tetrastigma* spp. (Image 9) of Vitaceae. During the reproductive phase, the protocorm emerges from the hosts' roots and then matures into a flower—the flower blooms in the winter, from November to February.

Eaglenest WS faces significant environmental challenges, including climate change and the spread of invasive plants at lower elevations. In this context, *Sapria himalayana* is a poorly understood taxon and highly sensitive to environmental factors. The plant has a naturally high bud mortality rate (Osathanunkul 2019). Extensive research on the fascinating Himalayan Sapria has been challenging because of its infrequent, unpredictable, and secretive flowering patterns. The study underscores the urgent need for comprehensive research into the elusive flowering phenology and enigmatic traits of *S. himalayana* to inform practical conservation efforts. In order to establish patterns and solve these mysteries, an annual plant survey is proposed in the Eaglenest WS. Apart from the West Kameng of Arunachal Pradesh, Namdapha National Park

of Changlang District is this plant's most extensively documented habitat (Arunachalam et al. 2004; Borah & Ghosh, 2018). Recent observations also indicate its presence in other parts of Arunachal Pradesh, including the evergreen forests of the East Siang District and the Mehao Wildlife Sanctuary in the Lower Dibang Valley District (Ahmad et al. 2020; Taram et al. 2020).

REFERENCES

Ahmad, A., A. Kumar, G.S. Rawat & G.V. Gopi (2020). Recent record of a threatened holoparasitic plant *Sapria himalayana* Griff. in Mehao Wildlife Sanctuary, Arunachal Pradesh, India. *Journal of Threatened Taxa* 12(10): 16399–16401. <https://doi.org/10.11609/jott.5168.12.10.16399-16401>

Arunachalam, A., D. Adhikari, R. Sarmah, M. Majumder & M.L. Khan (2004). Population and conservation of *Sapria himalayana* Griffith. in Namdapha National Park, Arunachal Pradesh, India. *Biodiversity & Conservation* 13(13): 2391–2397. <https://doi.org/10.1023/B:BIOC.0000048488.94151.f8>

Bänziger, H., B. Hansen & K. Kretyutyanont (2000). A new form of the hermit's spittoon, *Sapria himalayana* Griffith f. *albovinosa* Bänziger and Hansen f. nov. (Rafflesiaceae), with notes on its ecology. *Natural History Bulletin of the Siam Society* 48: 213–219.

Bänziger, H. (2004). Studies on hitherto unknown fruits and seeds of some Rafflesiaceae, and a method to manually pollinate their flowers for research and conservation. *Linzer Biologische Beitraege* 36(2): 1175–1198.

Bor, N.L. (1938). A sketch of the vegetation of the Aka Hills, Assam. A synecological study, Indian Forest Records (new series). *Botany* 1(4): i–ix, 103–221.

Borah D. & D. Ghosh (2018). *Sapria himalayana*: The Indian Cousin of World's Largest Flower. *Resonance* 23(4): 479–489. <https://doi.org/10.1007/s12045-018-0637-8>

Davis, C.C., P.K. Endress & D.A. Baum (2008). The evolution of floral gigantism. *Current Opinion in Plant Biology* 11(1): 49–57. <https://doi.org/10.1016/j.pbi.2007.11.003>

Devi, M.B., D.P.M. Maring & A. Devi (2022). A new distribution record and conservation plea of parasitic angiosperm, *Sapria himalayana* Griffith in Manipur. *Journal of Bioresearch* 1(1): 79–83.

Dorji, R., P. Phuntsho, U. Dechen, G. Gyehtshen, T. Samdrup, K. Dorji, R.B. Powrel, P. Dorji, K.P. Dhimal & D.G. Long (2022). Discovery, distribution and conservation of the rare parasitic plant *Sapria himalayana* (Rafflesiaceae) in Bhutan. *Curtis's Botanical Magazine* 39(3): 541–554. <https://doi.org/10.1111/curt.12461>

Elliott, S. (1990). The distribution, status and ecology of *Sapria himalayana* Griff. (Rafflesiaceae) in Thailand. *The Bulletin of British Ecological Society* 11: 246–248.

Griffith, W., (1844). *Sapria; Sapria himalayana*. *Proceedings of the Linnean Society of London* 1: 216–217.

Holden, J. (2010). Short communication Introducing some charismatic species of Cambodian flora. *Cambodian Journal of Natural History* July 2010(1): 12–14.

Mohan, D. & R. Athreya (2011). Sustainable bird based tourism in India's remote north-east frontier. *International Journal of Innovation Science* 3(1): 23–28.

Nayar M.P. & A.R.K. Sastry (1987). *Red Data Book of Indian Plants – Vol. I*. Botanical Survey of India, Calcutta, 310 pp.

Nikolov, L.A., P.B. Tomlinson, S. Manickam, P.K. Endress, E.M. Kramer & C.C. Davis (2014). Holoparasitic Rafflesiaceae possess the most reduced endophytes and yet give rise to the world's largest flowers. *Annals of Botany* 114(2): 233–242. <https://doi.org/10.1093/aob/mcu114>

Osathanunkul, M. (2019). eDNA-based monitoring of parasitic plant (*Sapria himalayana*). *Scientific Reports* 9(1): 9161. <https://doi.org/10.1038/s41598-019-45647-5>

Singh, Y.T., L. Khiangte, S.P. Singh H. Sailo & L. Ralte (2022). New distribution record and DNA barcoding of *Sapria himalayana* Griff. (Rafflesiaceae), a rare and endangered holoparasitic plant from Mizoram, India. *Journal of Threatened Taxa* 14(12): 22215–22220. <https://doi.org/10.11609/jott.7960.14.12.22215-22220>

Syiemiong, P., S.S. Chaturvedi, T. Arbenz & T. Tämaş (2022). A note on *Sapria himalayana* Griff. (Rafflesiaceae) from Jaintia Hills (Meghalaya, India). *Biodiversity Journal* 13(1): 73–78. <https://doi.org/10.31396/Biodiv.Jour.2022.13.1.73.78>

Tanaka, N., H. Nagamasu, S. Tagane, M.M. Aung, A.K. Win & P.P. Hnin (2019). Contributions to the F flora of Myanmar IV: a new species and a newly recorded taxon of the genus *Sapria* (Rafflesiaceae). *Taiwania* 64(4): 357. <https://doi.org/10.6165/tai.2019.64.357>

Taram, M., D. Borah, H. Tag & R.K. Choudhary (2020). An inventory of the native flowering plants in east Siang District of Arunachal Pradesh, India. *Journal of Threatened Taxa* 12(17): 17299–17322. <https://doi.org/10.11609/jott.6241.12.17.17299-17322>



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. Karen Schnabel, NIWA, Wellington, New Zealand
Dr. R.M. Sharma, (Retd.) Scientist, Zoological Survey of India, Pune, India
Dr. Manju Siliwal, WILD, Coimbatore, Tamil Nadu, India
Dr. G.P. Sinha, Botanical Survey of India, Allahabad, India
Dr. K.A. Subramanian, Zoological Survey of India, New Alipore, Kolkata, India
Dr. P.M. Sureshan, Zoological Survey of India, Kozhikode, Kerala, India
Dr. R. Varatharajan, Manipur University, Imphal, Manipur, India
Dr. Eduard Vives, Museu de Ciències Naturals de Barcelona, Terrassa, Spain
Dr. James Young, Hong Kong Lepidopterists' Society, Hong Kong
Dr. R. Sundararaj, Institute of Wood Science & Technology, Bengaluru, India
Dr. M. Nithyanandan, Environmental Department, La 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. Lional Monod, Natural History Museum of Geneva, Genève, Switzerland.
Dr. Asheesh Shivam, Nehru Gram Bharti University, Allahabad, India
Dr. Rosana Moreira da Rocha, Universidade Federal do Paraná, Curitiba, Brasil
Dr. Kurt R. Arnold, North Dakota State University, Saxony, Germany
Dr. James M. Carpenter, American Museum of Natural History, New York, USA
Dr. David M. Claborn, Missouri State University, Springfield, USA
Dr. Karen Schnabel, Marine Biologist, Wellington, New Zealand
Dr. Amazonas Chagas Júnior, Universidade Federal de Mato Grosso, Cuiabá, Brasil
Mr. Monsoon Jyoti Gogoi, Assam University, Silchar, Assam, India
Dr. Heo Chong Chin, Universiti Teknologi MARA (UiTM), Selangor, Malaysia
Dr. R.J. Shiel, University of Adelaide, SA 5005, Australia
Dr. Siddharth Kulkarni, The George Washington University, Washington, USA
Dr. Priyadarshan Dharma Rajan, ATREE, Bengaluru, India
Dr. Phil Alderslade, CSIRO Marine And Atmospheric Research, Hobart, Australia
Dr. John E.N. Veron, Coral Reef Research, Townsville, Australia
Dr. Daniel Whitmore, State Museum of Natural History Stuttgart, Rosenstein, Germany.
Dr. Yu-Feng Hsu, National Taiwan Normal University, Taipei City, Taiwan
Dr. Keith V. 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. Priyadarshan Dharma Rajan, Ashoka Trust for Research in Ecology and the Environment (ATREE), Royal Enclave, Bangalore, Karnataka, India

Fishes

Dr. Neelesh Dahanukar, IISER, Pune, Maharashtra, India
Dr. Topiltzin Contreras MacBeath, Universidad Autónoma del estado de Morelos, México
Dr. Heok Hee Ng, National University of Singapore, Science Drive, Singapore
Dr. Rajeev Raghavan, St. Albert's College, Kochi, Kerala, India
Dr. Robert D. Sluka, Chiltern Gateway Project, A Rocha UK, Southall, Middlesex, UK
Dr. E. Vivekanandan, Central Marine Fisheries Research Institute, Chennai, India
Dr. Davor Zanella, University of Zagreb, Zagreb, Croatia
Dr. A. Biju Kumar, University of Kerala, Thiruvananthapuram, Kerala, India
Dr. Akhilesh K.V., ICAR-Central Marine Fisheries Research Institute, Mumbai Research Centre, Mumbai, Maharashtra, India
Dr. J.A. Johnson, Wildlife Institute of India, Dehradun, Uttarakhand, India
Dr. R. Ravinesh, Gujarat Institute of Desert Ecology, Gujarat, India

Amphibians

Dr. Sushil K. Dutta, Indian Institute of Science, Bengaluru, Karnataka, India
Dr. Annemarie Ohler, Muséum national d'Histoire naturelle, Paris, France

Reptiles

Dr. Gernot Vogel, Heidelberg, Germany
Dr. Raju Vyas, Vadodara, Gujarat, India
Dr. Pritpal S. Soorae, Environment Agency, Abu Dhabi, UAE.
Prof. Dr. Wayne J. Fuller, Near East University, Mersin, Turkey
Prof. Chandrashekher U. Rironker, Goa University, Taleigao Plateau, Goa, India
Dr. S.R. Ganesh, Chennai Snake Park, Chennai, Tamil Nadu, India
Dr. Himansu Sekhar Das, Terrestrial & Marine Biodiversity, Abu Dhabi, UAE

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

NAAS rating (India) 5.64

Birds

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

Other Disciplines

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

Reviewers 2021–2023

Due to paucity of space, the list of reviewers for 2021–2023 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,
3A2 Varadarajulu Nagar, FCI Road, Ganapathy, Coimbatore,
Tamil Nadu 641006, India
ravi@threatenedtaxa.org & ravi@zooreach.org



OPEN ACCESS



The Journal of Threatened Taxa (JoTT) is dedicated to building evidence for conservation globally by publishing peer-reviewed articles online every month at a reasonably rapid rate at www.threatenedtaxa.org. All articles published in JoTT are registered under [Creative Commons Attribution 4.0 International License](#) 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.

www.threatenedtaxa.org

Articles

Negative interaction or coexistence? Livestock predation and conservation of wild carnivores in Kazinag National Park and adjacent region in the Kashmir Himalaya, India
– Uzma Dawood & Bilal A. Bhat, Pp. 26187–26197

Avifaunal diversity and conservation significance of coastal ecosystems on Rameswaram Island, Tamil Nadu, India
– H. Byju, H. Maitreyi, S. Ravichandran & N. Raveendran, Pp. 26198–26212

Conservation of sea turtles on the beach areas from Sonadia Island to Saint Martin's Island in the Bay of Bengal in Bangladesh
– M. Farid Ahsan, Shital Kumar Nath & Ashim Barua, Pp. 26213–26224

Noteworthy records of vascular plants from the West Bank, occupied Palestinian territories
– Banan Al-Sheikh, Mazin B. Qumsiyeh & Abdel-Salam Hubbieh, Pp. 26225–26233

Communications

Citizen science conservation: a case study using two threatened large aquatic American salamanders (Amphibia: Urodela), the Common Mudpuppy *Necturus maculosus* (Proteidae) and the Eastern Hellbender *Cryptobranchus alleganiensis* (Cryptobranchidae) observations on iNaturalist
– Shem Unger, Pp. 26234–26239

A preliminary study of odonate fauna in the high ranges of Munnar, southern Western Ghats, India
– T.S. Krishnanunni, Nazar Neha, R. Arya & P.O. Nameer, Pp. 26240–26250

A new species of *Arctodiaptomus* Kiefer, 1932 (Copepoda: Diaptomidae) from the Kumaun Himalaya of India
– Shaikhom Inaotombi & Debajit Sarma, Pp. 26251–26263

Morpho-anatomical characterization and conservation status of the Whisk Fern *Psilotum nudum* (L.) P.Beauv. (Polypodiopsida: Psilotaceae) from Cooch Behar District of West Bengal, India
– Aninda Mandal, Pp. 26264–26271

Six new reports of corticioid fungi from India
– Poonam, Avneet Pal Singh & Gurpaul Singh Dhingra, Pp. 26272–26282

On the *Maravalia echinulata* (Niessl ex Rabenh.) Ono (Pucciniales: Chaconiaceae) with reference to its host range and distribution
– Sayantan Jash & Asit Baran De, Pp. 26283–26290

Short Communications

A rare low elevation photographic record of Himalayan Serow *Capricornis sumatraensis* ssp. *thar* (Hodgson, 1831) from Nameri National Park, Assam, India
– B. Piraisoodan, Asish Immanuel Baglary, Saumitro Das & Debasish Buragohain, Pp. 26291–26295

Sightings of Red Goral *Nemorhaedus baileyi* in the community forest of the Upper Siang region, Arunachal Pradesh: an insight into its conservation challenges and implications within a tribal-managed landscape

– Takhe Bamin, Kishon Tekseng & Daniel Mize, Pp. 26296–26300

New record of *Sapria himalayana* Griff. (Rafflesiaceae) from Eaglenest Wildlife Sanctuary, Arunachal Pradesh, India

– Anisha Mandal, Aman Bishwakarma, Dibi Soma Monpa, Kabir Pradhan, Karma Wangdi Monpa & Rohit Rai, Pp. 26301–26305

***Pinnatella limbata* (Bryophyta: Neckeraceae): reassessment of conservation status based on recent findings**

– O.M. Sruthi, C.N. Manju, K.P. Rajesh & J. Enroth, Pp. 26306–26311

Additions of two genera of liverworts (Marchantiophyta) to the bryoflora of Nagaland, India

– Kazhuhrii Eshuo, Kholi Kaini & S.K. Chaturvedi, Pp. 26312–26316

***Phycolepidozia indica* (Marchantiophyta: Jungermanniales) an endemic leafless liverwort from Kerala part of Western Ghats, India**

– T. Krishnendhu, C.N. Manju, Ravi Athira & K.P. Rajesh, Pp. 26317–26321

Notes

First photographic documentation of avian egg predation by Common Palm Civet *Paradoxurus hermaphroditus* (Pallas, 1777) (Mammalia: Carnivora: Viverridae)

– Aritra Bhattacharya, B.N. Achyutha, Nandini Iyer, Somaiah Sundarapandian & Kuppusamy Sivakumar, Pp. 26322–26324

First record of Eurasian Crag Martin *Ptyonoprogne rupestris* (Scopoli, 1769) (Aves: Passeriformes: Hirundinidae) from Tamil Nadu, India

– S. Naveenkumar, Pp. 26325–26327

***Megachile vera* Nurse, 1901 (Insecta: Hymenoptera: Megachilidae): a new record of leaf cutter bee from Kerala, India**

– Anju Sara Prakash & C. Bijoy, Pp. 26328–26330

Publisher & Host



Threatened Taxa