Journal of Threatened Taxa

Building evidence for conservation globally

www.threatenedtaxa.org

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

Note

A new record of pyrenocarpous lichen to the Indian biota

N. Rajaprabu, P. Ponmurugan & Gaurav K. Mishra

26 January 2021 | Vol. 13 | No. 1 | Pages: 17607–17610
DOI: 10.11609/jott.6885.13.1.17607-17610

Journal of Threatened Taxa | www.threatenedtaxa.org | 26 January 2021 | 13(1): 17607–17610
ISSN 0974-7907 (Online) | ISSN 0974-7893 (Print)
https://doi.org/10.11609/jott.6885.13.1.17607-17610
#6885 | Received 12 November 2020 | Finally accepted 25 December 2020
PLATINUM OPEN ACCESS

NOTE

A new record of pyrenocarpous lichen to the Indian biota

N. Rajaprabu [1], P. Ponmurugan [2] & Gaurav K. Mishra [3]

[1,2] Biomedical Research Laboratory, Department of Botany, Bharathiar University, Coimbatore, Tamil Nadu 641046, India.
[3] Lichenology Laboratory, CSIR-National Botanical Research Institute, Lucknow, Uttar Pradesh 226001, India.
[1] lichenraja2017@gmail.com (corresponding author), [2] drponmurugan@gmail.com, [3] gmishrak@gmail.com

India has a rich diversity of lichens, including the pyrenocarpous lichens, which is a group of lichens that have flask-shaped ascocarps (fruiting bodies) called perithecia. Pyrenocarpous taxa commonly grow on the bark of a number of trees or sometimes on rocks, soil, or leaves in moist tropical and temperate regions of the world. The Western Ghats and eastern Himalayan regions hold the highest number of cryptogams together with lichens (Sinha et al. 2018). Both regions are rich in biodiversity so far and lichenologically were investigated by various workers for doing revisionary and floristic studies of the states. Aptroot (2012) revised the genus *Anthracothecium* and *Pyrenula* and listed 155 species of *Anthracothecium* and 745 species of *Pyrenula* from different parts of the world including India. India is represented by the occurrence of the 350 species of 44 genera and 11 families of pyrenocarpous lichens (Singh & Sinha 2010).

Upreti (1990) described 10 species of *Pyrenula*, exhibiting *Pyrenula subducta* (Nyl.) Müll. Arg., spore type of which seven species were new records to the Indian lichen biota. Awasthi (1991) consolidated the information of different lichen genera in a key to the microlichens India, Nepal & Sri Lanka and enumerated 229 species of pyrenocarpous lichens. Upreti (1991a,b, 1992, 1993a,b) studied the *Pyrenula* genus of pyrenocarpous lichens from India and reported several new records for Indian lichen biota. Jagadeesh et al. (2005) revised the genus *Pyrenula* and reported *Pyrenula subcylindrica* Jagadeesh & Upreti new to science from India. Recently, Ingle et al. (2018) listed *Pyrenula* taxa from India and reported 77 species including 10 new records from the country. Based on a revisionary study of *Pyrenula,* the aim of the present study is to provide a new record for lichen biota.

Materials and Methods

The present study is based on freshly collected specimens from Iravangallaru located at Megamalai Wildlife Sanctuary, Tamil Nadu (Figure 1) and previously collected sample from Arunchal Pradesh's specimens

Editor: Anonymity requested.

Date of publication: 26 January 2021 (online & print)

Citation: Rajaprabu, N., P. Ponmurugan & G.K. Mishra (2021). A new record of pyrenocarpous lichen to the Indian biota. *Journal of Threatened Taxa* 13(1): 17607–17610. https://doi.org/10.11609/jott.6885.13.1.17607-17610

Funding: Indian Council of Medical Research (ICMR), New Delhi, India (58/18/2015-TFV/BMS/ dated 23-02-2018); Department of Science & Technology, New Delhi, India (PDF/2017/000356).

Competing interests: The authors declare no competing interests.

Acknowledgements: The authors would like to acknowledge: the Indian Council of Medical Research (ICMR), New Delhi, India for financial support to carry out the research work; director, CSIR-NBRI for providing the library and Laboratory facilities; and Drs. D.K. Upreti & S. Nayaka, Lichenology Laboratory, CSIR-National Botanical Research Institute (NBRI), Lucknow, Uttar Pradesh, India for identification of lichen specimen. GKM would like to thank the Department of Science & Technology, New Delhi for award of N-PDF (PDF/2017/000356).

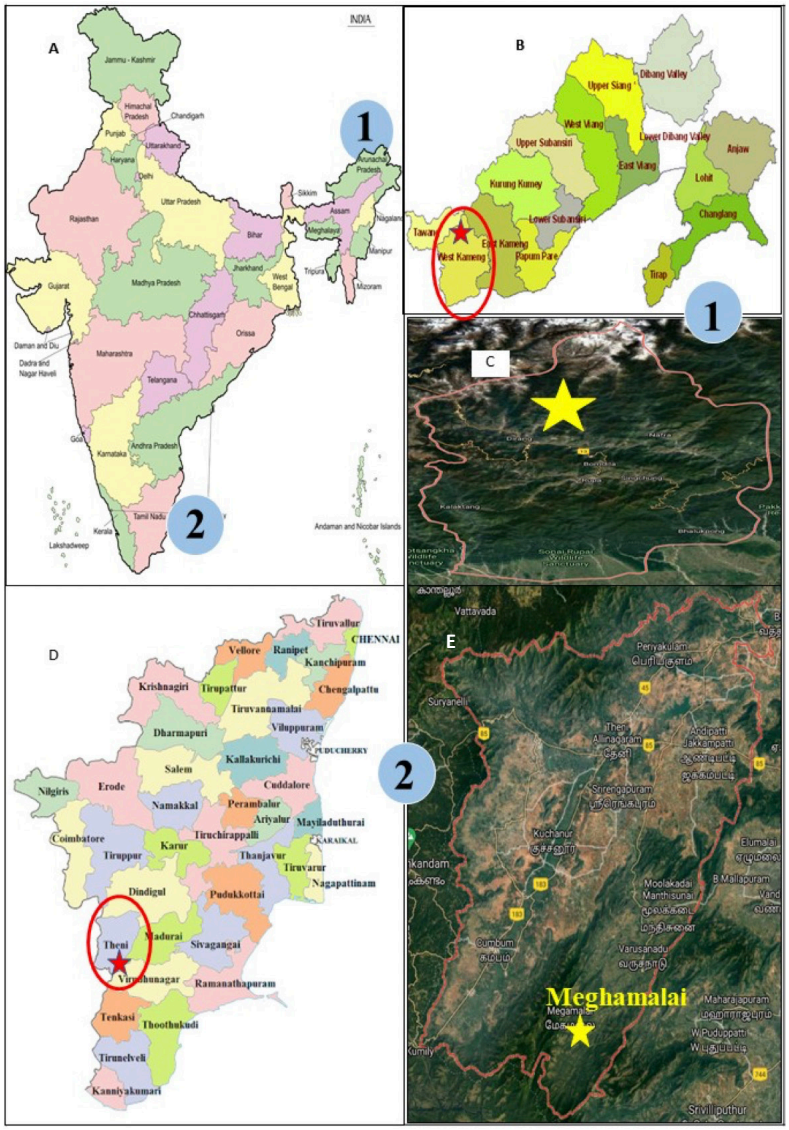

Figure 1. The distribution of *Pyrenula subglabrata* from Arunachal Pradesh from northeastern India and southern Western Ghats in Tamil Nadu. A—India (1–2 AP & TN States geographic borders) | B—Arunachal Pradesh (C—West Kameng District) | D—Tamil Nadu | E—Theni District - Megamalai Wildlife Sanctuary.

deposited in the herbarium CSIR-National Botanical Research Institute, Lucknow (LWG). Morphological and anatomical characters were examined using stereo zoom Leica S8APO and light DM2500 microscopes attached with camera. Thin sections of perithecia were cut using a razor blade under the stereoscope zoom microscope. All anatomical measurements were recorded in plain water, while 10% KOH was used for detailed study of asci and ascospores. For spot tests the usual reagents of K, C, and P were used and for identification of lichens substance by thin layer chromatography (TLC) was performed in solvent system C following Orange et al. (2001). The specimens were identified up to species level with the help of keys of Awasthi (1991), and Aptroot (2006, 2012). The identified specimens were deposited in the herbarium of CSIR-National Botanical Research Institute, Lucknow.

Pyrenula subglabrata (Nyl.) Müll. Arg.

Bot. Jb. 6: 410 (1885).

= *Verrucaria subglabrata* Nyl., in Nylander & Crombie 1883.

Thallus corticolous, corticate, smooth, continuous, thin, up to 10cm across, pale yellow to yellowish-brown, without pseudocyphellae; prothallus indistinct; photobiont trentepohlia. Ascomata perithecioid, simple, dispersed, conical, emergent, 0.3–0.5 mm diam., black, edges without thallus covering; ostioles eccentric to lateral, red-brown, pointing in various directions; hamathecium hyaline, densely inspersed with oil droplets; asci cylindrical to clavate, 4–8 spored, 40–48 × 10–12.5 µm; ascospores brown, 3–septate, 16–22

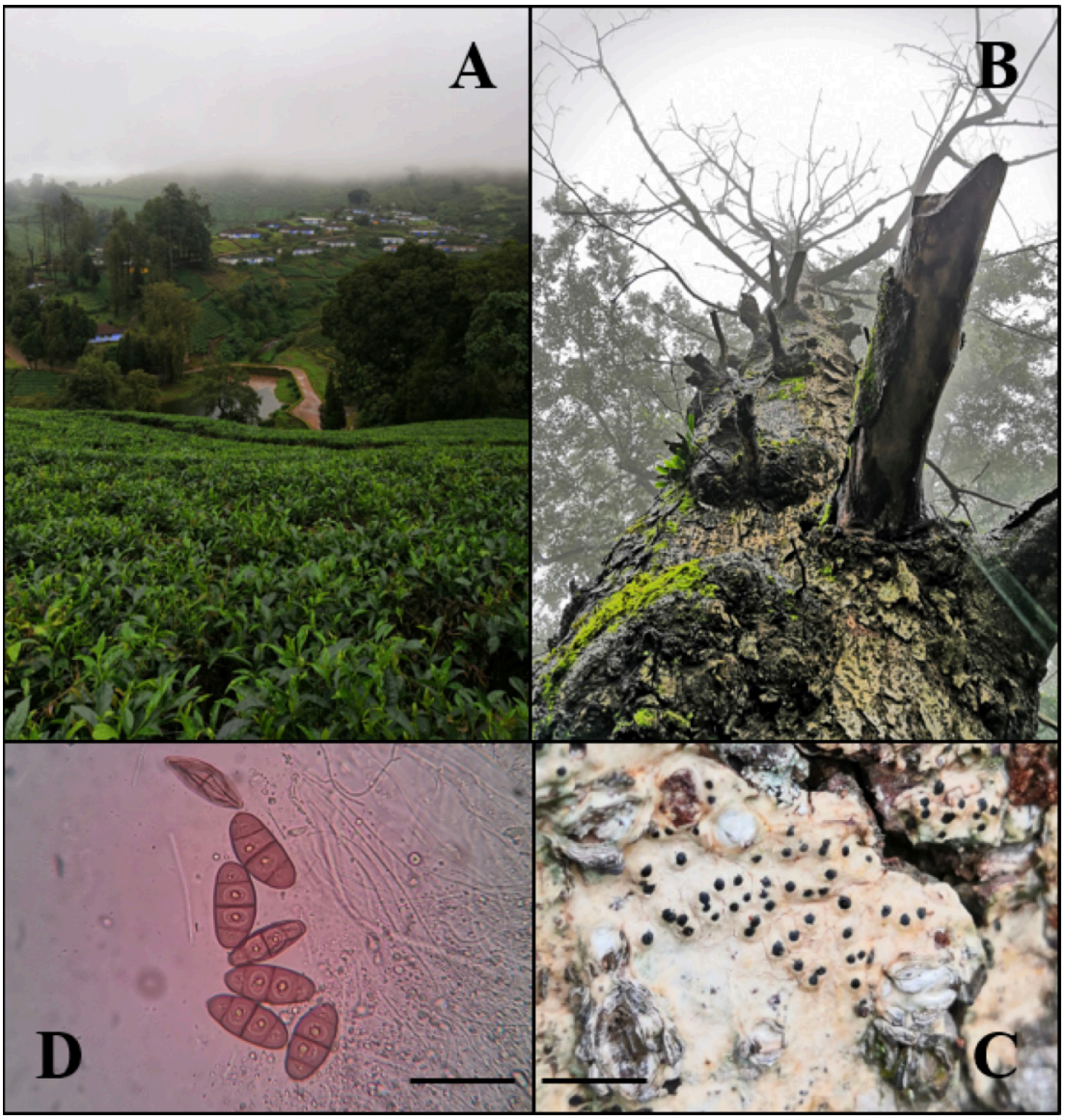

Image 1. Specimen analysis: A—The collection point -Iravangallaru (© N. Rajaprabu) | B—gigantic dead wood tree, habitat (© N Rajaprabu) | C—pale yellowish crustose lichen thallus with Perithecia (© N Rajaprabu) | D—triseptate ascospores (© N Rajaprabu & G.K. Mishra). Scale: C = 1cm, D = 20µm.

× 8–11 µm, central lumina not strongly elongated, terminal lumina mostly separated from the exposere wall by endospore layer. Pycnidia not seen (Image 2).

Chemistry: Thallus K–, C–, KC–, PD–, UV–; no lichen substance present in TLC.

Discussion: *Pyrenula subglabrata* closely resembles *Pyrenula oculata* A. Singh & Upreti in that they have similar ascomata and not constricted ascospores but the *P. subglabrata* differs in smaller ascospores 18–20 × 5–10 µm. *Pyrenula minarum* Vain is another species similar to *P. subglabrata* in having similar morphology and ascomata except the size and shape of ascospores of *P. subglabrata*. *Pyrenula occidentalis* (R.C. Harris) R.C. Harris also closely resembles *P. subglabrata* in having similar morphology and inspersed hemithecium but *P. subglabrata* lacking anthraquinone neither thallus nor ascomata (Aptroot 2012; Cáceres et al. 2013).

Ecology and distribution: The species is found growing on smooth bark of trees at altitudes of between 1,747–2,575 m in the Arunachal Pradesh and Tamil Nadu states of India. Previously, this species is known only from Singapore (Aptroot et al. 2012). This species is a new record for India.

Specimens examined: 08-009440/A (LWG), 12.xi.2008, India, Arunachal Pradesh, West Kameng District, Sela Pass, 27.503'N, 92.104'E, 2,575m, on bark, coll. D.K. Upreti, U. Dubey, R. Khare & G.K. Mishra. 19-36053 (LWG), 02.ix.2019, Tamil Nadu, Megamalai

Wildlife Sanctuary, Iravangallaaru, Behind Vinayakar Temple, 9.723'N, 77.456'E, 1,747m, coll. Rajaprabu, N. & G.K. Mishra.

Results and Discussion

The pyrenocarpous lichens communities are a good indicator of young and regenerated forest type. The rich diversity of lichens clearly indicates that most of the forest within the eastern Himalayan region has good health of forest (Singh 1999; Rout et al. 2010). India is represented by the occurrence of 82 species of *Pyrenula* and maximum diversity was reported from the Western Ghats and the eastern Himalayan region (Mishra et al. 2020). While Tamil Nadu has semi-evergreen forests and smooth bark trees, so far 22 species of *Pyrenula* have been reported, while Arunachal Pradesh with evergreen dense moist forests have a maximum diversity of *Pyrenula* with 40 species reported (Awasthi 1991; Nayaka et al. 2001; Hariharan & Balaji 2007; Singh & Sinha 2010). In the present study *Pyrenula subglabrata* (Nyl.) Müll. Arg. is provided as a new record for Indian lichen biota.

Conclusion

The evergreen forest in both the regions exhibit the maximum diversity of *Pyrenula* species. The smooth bark trees along the streams in moist shady habitat bear pyrenolichens mostly the species *Pyrenula* on bark, leaves and rocks. Due to dense virgin forests that cover tracts of land in moist regions of the states are suitable for growth of *Pyrenula* lichens. Therefore, occurrence of *Pyrenula* species indicates an evergreen forest with abundance of smooth barked trees. The present investigation is of a preliminary nature, a more intensive and extensive survey will definitely add additional *Pyrenula* taxa to the country.

Key to the Taxa

1a	Spores oval	2
b	Spores ellipsoidal	3
2a	Centrum I+	4
b	Centrum I-	5
3a	Perithecia < 1.0mm diam	6
b	Perithecia >1.0mm diam	*P. minarum* Vain
4a	Centrum I+ blue, with oil globules	*P. cayennensis* Müll. Arg.
b	Centrum I+ wine red, without oil globules	*P. mastophora* (Nyl.) Müll. Arg.
5a	Centrum I-, with oil globules	*P. kurzii* A.Singh & Upreti.
b	Centrum I- without oil globules	*P. introducta* (Stirton) Zahlbr.
6a	Ascospores < 21µm long	7
b	Ascospores >21µm long	*P. oculata* A.Singh & Upreti
7a	Ascomata with anthraquinone	*P. occidentalis* (R.C.Harris) R.C.Harris
b	Ascomata without anthraquinone	*P. subglabrata* (Nyl.) Müll. Arg.

References

Aptroot, A. (2006). Three new species of *Lithothelium* (*Pyrenulaceae*) from China and Thailand, with a revised world key and annotated list of species. *The Lichenologist* 38(6): 541–548.

Aptroot, A. (2012). "A world key to the species of Anthracothecium and Pyrenula." *The Lichenologist* 44(1): 5–53.

Awasthi, D.D. (1991). A key to the Microlichens of India, Nepal & Sri Lanka. *Bibliotheca Lichenologica* 40: 1–336.

Cáceres., E.S. E.S. Marcela, A. Aptroot, M.P. Nelsen & R. Lücking (2013). "Pyrenula sanguinea (lichenized Ascomycota: Pyrenulaceae), a new species with unique, trypethelioid ascomata and complex pigment chemistry." *The Bryologist* 116(4): 350–357.

Hariharan, G.N. & P. Balaji (2007). Checklist of Lichens and Lichenicolous Fungi of Tamil Nadu (India) - Database. Preliminary version http://tnenvis.nic.in/tnenvis_old/Lichens/tamil-nadu.htm

Ingle, K.K., V. Uppadhyay, S. Nayaka, S. Trivedi & D. Sahoo (2018). New records and an updated key of Pyrenula from India. *Cryptogam Biodiversity and Assessment* (Special Volume 2018): 37–46.

Jagadeesh, T.A.M.R., D.K. Upreti & G.P. Sinha (2005). Pyrenula subcylindrica, a new pyrenocarpous lichen from India. *Lichenologist* 37(2): 109–110.

Mishra, G.K., S. Nayaka & D.K. Upreti (2020). Distribution, biomonitoring and conservation studies of pyrenocarpous lichens in India. *G- Journal of Environmental Science and Technology* 7(5): 54–59.

Nayaka, S., D.K. Upreti & P.K. Divakar (2001). Distribution and diversity of lichens in Meghamalai Wildlife Sanctuary, Kambam District, Tamil Nadu, India. *Biological Memoirs* 27(1): 51.

Orange A.P., W. James & F.J. White (2001). *Microchemical Methods for the Identification of Lichens*. British Lichen Society, U.K., 101pp.

Rout, J., P. Das & D.K. Upreti (2010). Epiphytic lichen diversity in a reserve forest in south Assam, north India. *Tropical Ecology* 51(2): 281–288.

Singh, K.P. (1999). Lichens of Eastern Himalaya region, pp. 153–204. In: Mukerji, K.G., D.K. Upreti & Upadhyay (eds.). *Biology of Lichens*. Aravali Books International, New Delhi.

Singh, K.P. & G.P. Sinha (2010). *Indian Lichens: An Annotated Checklist*. Botanical Survey of India, Ministry of Environment and Forests, Kolkata, 571pp.

Singh, K.P., P. Singh & G.P. Sinha (2018). Lichen diversity in the Eastern Himalaya biodiversity hotspot region, India. *Cryptogam Biodiversity and Assessment* (Special Volume 2018): 71–114.

Upreti, D.K. (1990). Lichen genus *Pyrenula* in India: I *Pyrenula subducta* spore type. *Journal of the Hattori Botanical Laboratory* 68: 269–278.

Upreti, D.K. (1991a). Lichen genus *Pyrenula* from India: The species with spores of Pyrenula brunnea type. *Bulletin De La Societe Botanique De France Lettres Botaniques* 138(3): 241–247.

Upreti, D.K. (1991b). Lichen genus *Pyrenula* from India: IV. *Pyrenula cayennensis* spore type. *Cryptogamie Bryologie Lichenologie* 12(1): 41–46.

Upreti, D.K. (1992). Lichen genus *Pyrenula* from India: VII. *Pyrenula mastophora* spore type. *Feddes Repertorium* 103(3–4): 279–296.

Upreti, D.K. (1993a). Lichen genus *Pyrenula* from India: II. *Pyrenula camptospora* spore type, III. *Pyrenula pinguis*. spore type. *Acta Botanica Gallica* 140(5): 519–523.

Upreti, D.K. (1993b). Notes on Arthopyrenia species from India. *Bryologist* 96(2): 226–232.

Journal of Threatened Taxa

www.threatenedtaxa.org

PLATINUM OPEN ACCESS

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

January 2021 | Vol. 13 | No. 1 | Pages: 17455–17610
Date of Publication: 26 January 2021 (Online & Print)
DOI: 10.11609/jott.2021.13.1.17455-17610

Member

FJN

Publisher & Host

WILD ZOOREACH

Threatened Taxa