

A new species and new records of *Pyrenula* (Pyrenulaceae) from India

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Abstract: A new lichen species, *Pyrenula darjeelingensis* (Pyrenulaceae), is described from the Eastern Himalayan region of India. It is characterized by having 5-septate to submuriform ascospores with papillate apices and the terminal lumina mostly not separated from the exospore by an endospore layer. Six additional species of *Pyrenula* are reported for the first time from India: *P. acutalis* R. C. Harris, *P. dermatodes* (Borrer) Schaer., *P. mastophoroides* (Nyl.) Zahlbr., *P. mucosa* (Vain.) R. C. Harris, *P. subelliptica* (Tuck.) R. C. Harris and *P. thelemorpha* Tuck.

Key words: pyrenocarpous lichens, Pyrenulales

Introduction

Pyrenula, a cosmopolitan lichen genus of c. 200 species, is most diverse in tropical regions (Aptroot 2002). Harris (1989) discussed the circumscription of the genus and merged several genera under *Pyrenula*. Subsequently, Harris (1995) and Aptroot *et al.* (1997, 2008) made further significant contributions to the genus. Upreti (1998) revised the genus in India and recognized 78 species. During the course of our lichenological studies in Eastern India (Assam and West Bengal), the genus *Pyrenula* has also been studied. The investigation has resulted in the discovery of a new species and six new records for India. The new species is described below as *Pyrenula darjeelingensis*, and brief notes of the new records are also provided.

Materials and Methods

Specimens collected from eastern India and deposited in BSA and CAL herbaria were examined. External morphology was studied using an Olympus stereomicroscope. Thin hand-cut sections of thalli and asco-

mata were mounted in water, 10% KOH solution and iodine solution and examined with a Leica DM 2500 microscope.

The New Species

Pyrenula darjeelingensis Jagadeesh Ram & G. P. Sinha sp. nov.

Thallus flavido-brunneus, sine pseudocyphellis, corticatus. Perithecia emergentia, globosa vel subglobosa, 0.5–1 mm lata, hymenio insperso, ascosporis (3–)5-septatis vel submuriformis, 23–29(–33) × (8–)9–13(–14) µm.

Typus: India, West Bengal, Darjeeling, Happy Valley Tea Estate, alt. c. 2100 m, on shade tree, 16 May 2005, V. N. Singh 2248 (BSA—holotypus).

(Figs 1 & 2)

Thallus crustose, corticolous, epiphloeodal, irregular, up to 6 cm across, yellowish brown to yellow-orange, continuous, smooth, not pseudocyphellate, K–, UV–, corticate; prothallus indistinct; cortex yellowish, 40–95 µm thick; photobiont layer 16–40 µm thick; photobiont *Trentepohlia*.

Perithecia solitary, initially immersed, later semi-immersed to emergent, globose to subglobose, occasionally hemispherical, 0.5–1 mm diam. *Ostiole* apical, pale, often indistinct. *Perithecial wall* complete, spreading laterally, carbonized, lacking crystals, 16–27 µm thick at base, 43–115 µm thick

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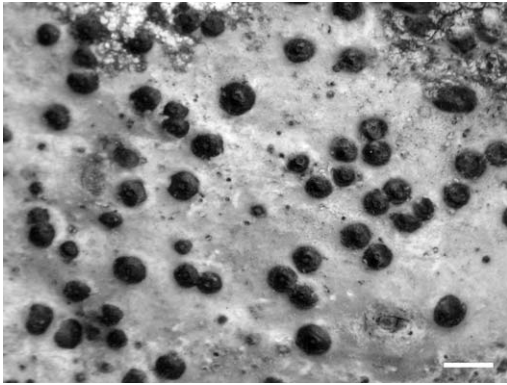


FIG. 1. *Pyrenula darjeelingensis*, habit (holotype). Scale = 1 mm.

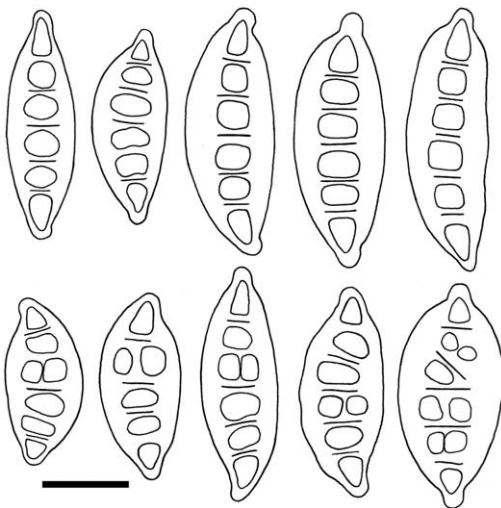


FIG. 2. *Pyrenula darjeelingensis*, ascospores. (holotype). Scale = 10 μ m.

laterally. *Hymenium* hyaline, fully inspersed, I+ orange. *Paraphyses* unbranched, 1 μ m thick. *Asci* clavate, 8-spored. *Ascospores* uniseriate to sub-biseriate, grey-brown, ellipsoid to fusiform, with papillate ends, transversely (3–)5-septate to submuriform with 1 longitudinal septum in the middle, distoseptate, with 1–5 incomplete eusepta, 23–29(–33) \times (8–)9–13(–14) μ m; lumina angular, occasionally rounded; terminal lumina mostly not separated from the exospore by an endospore layer.

Remarks. *Pyrenula darjeelingensis* is characterized by the (3–)5-septate to submuriform ascospores with papillate ends and the terminal lumina mostly not separated from the exospore by an endospore layer. It resembles *P. erumpens* R. C. Harris in ascospore morphology, but the latter species has an eccentric to lateral ostiole, non-inspersed hymenium, 5–8-septate to submuriform larger ascospores (45–65 \times 20–25 μ m). *Pyrenula concatenans* (Nyl.) R. C. Harris is another species having 3–5-septate to submuriform ascospores, but it has non-inspersed hymenium, ascospores with rounded ends, and the terminal lumina are separated from the exospore by a thick endospore layer and by the post-mature ascospores containing reddish oil. *Pyrenula quinquesepata* Aptroot also closely resembles the new species, but it differs in having I+ blue hymenium and consistently transversely 5-septate ascospores that lack eusepta (Aptroot *et al.* 1997, 2008; Harris 1989). At present the new species is known only from the type locality.

New Records

Pyrenula acutalis R. C. Harris

This species has been found to be common in the plains and foot hills of Assam and West Bengal. Harris (1989) stated that the species is endemic to Louisiana (USA), but recently Aptroot (2003) and Aptroot *et al.* (2008) reported it from Taiwan and Costa Rica, respectively.

Specimens examined. **India:** *Assam:* Sibsagar district, Rajabari T. E., on tea bark, 2004, Jagadeesh Ram & V. N. Singh 1401A (BSA); Karbi Anglong, Silonijan, Sobhaneswari T. E., on shade tree, 2005, V. N. Singh 1773 (BSA); North Cachar Hill, Borjalanga, Rosekandy T. E., on shade tree, 2005, V. N. Singh 1814 (BSA); *ibid.*, Pailapool, Dewan T. E., on shade tree, 2005, V. N. Singh 1904 (BSA); *ibid.*, Sonai, Binnakandy T. E., on shade tree, 2005, V. N. Singh 1930 (BSA); *ibid.*, Jalalpur, Jalapur T. E., on shade tree, 2005, V. N. Singh 2056 (BSA); Tinsukia, Makum Road, Abandoned T. E., on shade tree, 2006, G. P. Sinha & V. N. Singh 2960 (BSA); *ibid.*, on tea bark, G. P. Sinha & V. N. Singh 2974 (BSA); Lakhimpur, Jonai Road, Ananda T. E., on shade tree, 2006, G. P. Sinha & V. N. Singh 3203 (BSA); Tezpur, Rangapara, Ghoirallia T. E., on tea bark, 2006, G.P. Sinha & V.N. Singh 3369 (BSA);

Dubri, Choper, Choper T.E., on tea bark, 2006, *G. P. Sinha & V. N. Singh* 3486 (BSA). *West Bengal*: 24-Parganas district, Sundarbans Biosphere Reserve, Tentulia, 1975, Roychowdhury 2103 (CAL); *ibid.*, Namkhana, Narayanpur, 1973, *Roychowdhury* 2882 (CAL); Jalpaiguri district, Kalchni, Kalchini T. E., on shade tree, 2005, *V. N. Singh* 2430 (BSA).

Pyrenula dermatodes (Borrer) Schaer.

This subcosmopolitan species has been found on the hilly slopes of the Neora Valley National Park in the Eastern Himalaya. Usually it reacts UV+ yellow due to the presence of lichexanthone, but specimen 4338 is UV– and 4341 is partly UV+ yellow.

Specimens examined. India: West Bengal: Darjeeling, Neora Valley National Park, Neora river bank, N 27° 06' 30.39", E 88° 43' 04.0", alt. 2245 m, 2008, *Jagadeesh Ram* 4338 (BSA); *ibid.*, N 27° 05' 50.4", E 88° 43' 29.1", alt. 2189 m, 2008, *Jagadeesh Ram* 4341 (BSA).

Pyrenula mastophoroides (Nyl.)

Zahlbr.

Apparently this is a pantropical species, previously known from the Neotropics. It has been found on the hill slopes of Neora Valley National Park in the Eastern Himalaya.

Specimen examined. India: West Bengal: Darjeeling, Neora Valley National Park, Aloorbari, N 27° 07' 26.3", E 88° 43' 06.3", alt. 2435 m, 2008, *Jagadeesh Ram* 4434 (BSA).

Pyrenula mucosa (Vain.) R. C. Harris

This pantropical species has been collected on the hill slopes of Neora Valley National Park in the Eastern Himalaya.

Specimen examined. India: West Bengal: Darjeeling, Neora Valley National Park, Aloorbari, N 27° 07' 26.3", E 88° 43' 06.3", alt. 2435 m, 2008, *Jagadeesh Ram* 4434 (BSA).

Pyrenula subelliptica (Tuck.) R. C.

Harris

This pantropical species has been found to be common on the plains of Assam and West Bengal. Specimens from India have a non-inspersed hymenium, but those from North America have an inspersed hymenium (Harris 1989).

Specimens examined. India: Assam: Nagaun, Solanath T.E., on shade tree, 2005, *V. N. Singh* 1579 (BSA); Karbi Anglong, Silonijan, Sobhaneswari T. E., on shade tree, 2005, *V. N. Singh* 1695, 1770 (BSA); North Cachar Hill, Pailapool, Dewan T. E., on shade tree, 2005, *V. N. Singh* 1831, 1892, 1920 (BSA); *ibid.*, Sonai, Binnakandy T. E., on shade tree, 2005, *V. N. Singh* 1850 (BSA); *ibid.*, Jalalpur, Jalapur T. E., on shade tree, 2005, *V. N. Singh* 2009, 2088 (BSA); Tezpur, Biswanath Charlie, Monabari T. E., on shade tree, 2006, *G. P. Sinha & V. N. Singh* 3450 (BSA). *West Bengal*: Jalpaiguri district, Hatipota, Jaianti T. E., on shade tree, 2005, *V. N. Singh* 2405 (BSA).

Pyrenula thelemorpha Tuck.

This pantropical species has been found on a non-mangrove tree introduced into a mangrove reserve.

Specimen examined. India: West Bengal: Sundarbans Biosphere Reserve, Haldibari forest camp, on *Albizia*, 2004, *Jagadeesh Ram* 906A (BSA).

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