



A new species of *Buellia* (Caliciaceae) from the Western Ghats, India with additional records for Kerala

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ABSTRACT: A new saxicolous lichen species, *Buellia maharajensis*, is described from Mathikettan Shola National Park, Idukki, Kerala, India. The new species is morphologically similar to *Buellia quartziana* S.R. Singh & D.D. Awasthi, but differs by I-medulla, *aethalea*-type exciple and the absence of atranorin. A detailed comparison with allied species is given. Further, *Buellia hemispherica* S.R. Singh & D.D. Awasthi and *Buellia nilgiriensis* S.R. Singh & D.D. Awasthi are recorded for the first time from Kerala.

KEY WORDS: *Buellia maharajensis*, *Buellia quartziana*, Lichenized Ascomycota, Mathikettan Shola National Park.

INTRODUCTION

The Western Ghats are a major biodiversity hotspot in India, renowned for its species richness and high degree of endemism, with the southern region exhibiting greater diversity and a higher level of endemism compared to the central and northern parts (Pascal, 1988; Myers *et al.*, 2000; Davidar *et al.*, 2007; Joshi and Karanth, 2013; Sivadas *et al.*, 2023). Mathikettan Shola, a unique montane tropical forest near Poopara village in Idukki district, Kerala, India, made headlines in 2003, when the government evicted encroachers from forest land and declared 12.2 km² of forest as Mathikettan Shola National Park (Kerala Forest and Wildlife Department, 2020).

This eco-sensitive zone is characterized by climatic conditions suitable for the luxurious growth of lichens (Anilkumar *et al.*, 2022). With this in mind, an initiative was taken to explore the lichen diversity in Mathikettan Shola National Park, as a continuation of prior research on buellioid species within Mathikettan Shola National Park (Anilkumar *et al.*, 2025). Singh and Awasthi (1981) carried out the first exhaustive systematic study of the genus *Buellia* in India and documented 39 species. Subsequent taxonomic studies have increased the number of *Buellia* species reported from India to 49, of which 17 are endemic. Of these, eight species have so far been recorded from Kerala, including one endemic species (Sinha *et al.*, 2024; Anilkumar *et al.*, 2025; Pal *et al.*, 2025).

In the present paper, a new *Buellia* species is introduced and two other species are reported as new distributional records for Kerala. The current report adds three more species, increasing the total number of *Buellia* species recorded in the state to eleven.

MATERIALS AND METHODS

A reconnaissance survey of lichens was conducted in Mathikettan Shola National Park during 2021–2022. Lichens were opportunistically collected from various substrates, air dried and curated as herbarium specimens according to the standard methods (Ohmura, 2014). The specimens were deposited in the herbaria of Maharaja's College (MCH) and KSCSTE-Kerala Forest Research Institute (KFRI). Identification was carried out through morphological and anatomical examinations using stereo zoom microscopes (Labomed CZM6 and Leica EZ4W) and a trinocular compound microscope (Carl Zeiss Primo star). Lichen substances were identified using thin-layer chromatography (TLC) with solvent system A (toluene: 1,4-dioxane: acetic acid: 180:60:8), B (hexane: diethyl ether: formic acid: 130:80:20) and C (toluene: acetic acid: 85:15) following standard procedures outlined in White and James (1985), Orange *et al.* (2010) and Elix (2022). Additionally, keys and descriptions from the published floras and monographs were used for precise species comparison and verification.

TAXONOMIC TREATMENT

New species

Buellia maharajensis A.Anilkumar, R.Ngangom, S.Joseph, Nayaka & Sequeira, *sp. nov.* **Fig. 1**

Mycobank No.: MB 864558

Type: INDIA, Kerala: Idukki district, Mathikettan Shola National Park, Choondal, 10.01118° N 77.239025° E, 1351 m elev., 28 April 2022, Aswathi Anilkumar 7097 (holotype: MCH, isotype: KFRI).

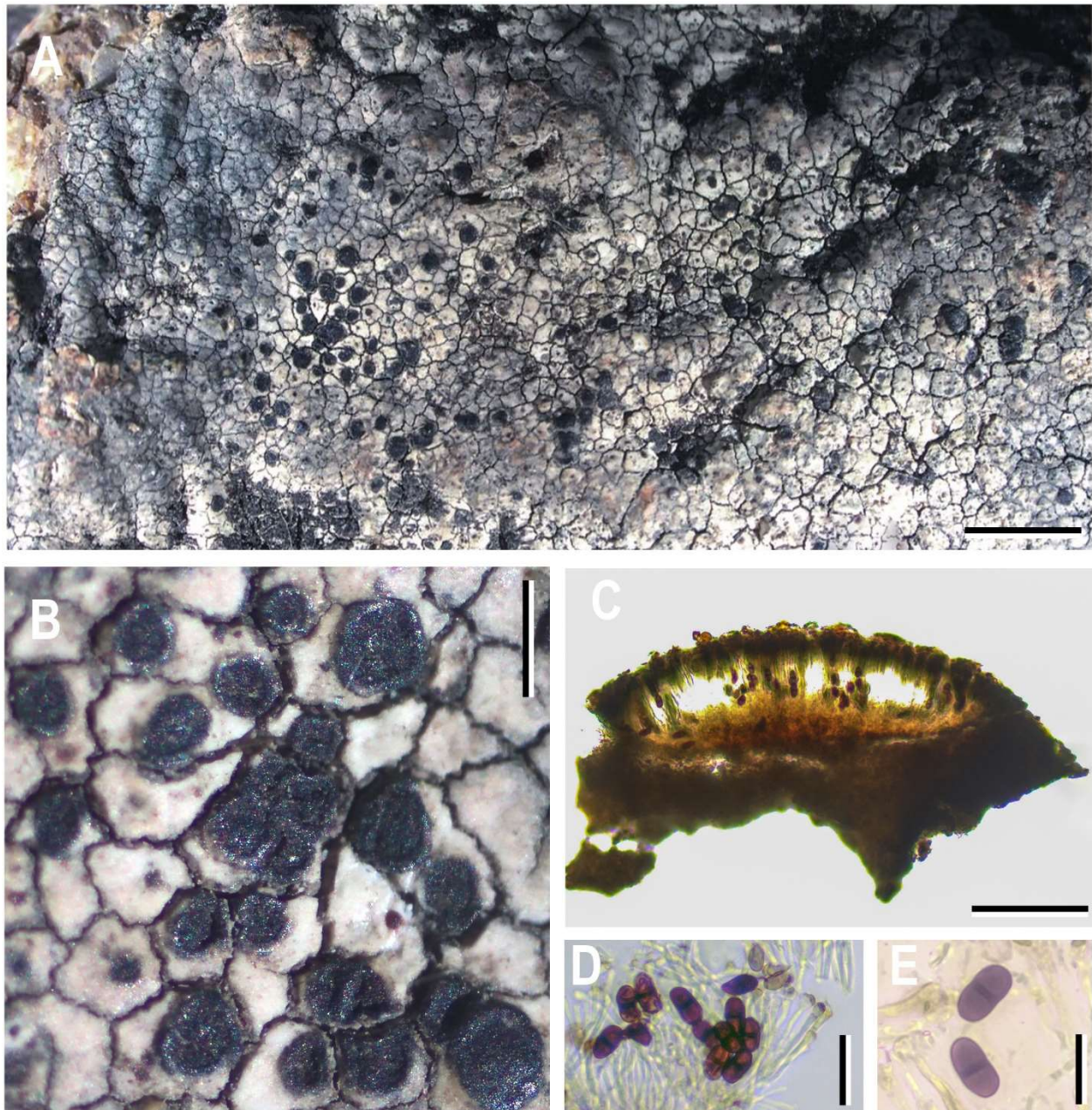


Fig. 1. *Buellia maharajensis*. A. Thallus; B. Apothecium; C. Section of the apothecium; D. Ascospores with paraphyses; E. Ascospores. Scale bar: A = 0.2 cm; B = 0.05 cm, C = 100 μ m, D = 20 μ m, E = 15 μ m.

Diagnosis: The new species is similar to *Buellia quartziana* S.R. Singh and D. D. Awasthi, but differs by I– medulla, *aethalea*-type exciple and the absence of atranorin.

Description: Thallus saxicolous, rimose-areolate, thin to moderately thickened, not effigurate, surface rough, fissured, 3–7 cm across, prothallus present around the thallus margins, conspicuous black; upper surface pale ivory grey to reddish grey, dull, lacking pruina; isidia and soredia absent; medulla white, non-amyloid (I–), H_2SO_4 –. Apothecia frequent, sessile, black, lecideine with

prominent margin, disc flat to slightly concave, epruinose, 0.2–0.5 mm diam; exciple dark brown, *aethalea*-type, HNO_3 –, 10–11 μ m wide; epihymenium brown, continuous with exciple, HNO_3 –; hymenium hyaline, not interspersed with oil droplets, 40–70 μ m high; paraphyses unbranched, septate, apically swollen with brown-black tip/cap; hypothecium dark brown, 130–150 μ m high; asci clavate, *Bacidia*-type, 8-spored; ascospores *Buellia*-type, transversely 1-septate, brown, oblong to ellipsoid, usually not constricted near septum, wall equally thickened, ends obtuse, rarely curved, surface smooth, 11–13 $\times$ 6–8 μ m.



Pycnidia not seen.

Chemistry and spot tests: Thallus K⁺ red, C⁻, P⁺ yellow to orange, UV⁺ orange; medulla K⁺ yellow turning red, with needle-shaped crystals, C⁻, P⁺ deep yellow-orange; lichexanthone-type compound and norstictic acid detected by TLC.

Etymology: The specific epithet *maharajensis* is named after Maharaja's College, Kerala, India, on the occasion of the institution's 150th anniversary. This is in recognition of the college's significant contributions to education par excellence and scientific research.

Distribution and ecology: Found on rocks in montane wet grasslands of Mathikettan Shola National Park in an elevation range of 1351 to 1809 m. The specimens were collected from four different regions of the park viz., Choondal, Vattappara, Karadippara and Sarvekkalpara, in open, sun-exposed areas.

Additional specimens examined (paratypes): INDIA. Kerala: Idukki district, Mathikettan Shola National Park, Sarvekkalpara, 10.005353° N and 77.255434° E, 1809 m elev., on rock, 26 March 2022, *Aswathi Anilkumar* 2847 (MCH); *ibid.*, Karadippara, 10.007983° N and 77.246951° E, 1780 m elev., on rock, 28 April 2022, *Aswathi Anilkumar* 2856 (MCH); *ibid.*, Vattappara, 10.004425° N and 77.239209° E, 1676 m elev., on rock, 12 April 2022, *Aswathi Anilkumar* 2839 (MCH).

Notes: *Buellia maharajensis* is characterised by the presence of I⁻ medulla and the *aethalea*-type exciple. It is similar to *B. quartziana* S.R. Singh & D.D. Awasthi (Singh and Awasthi, 1981) in morphological features and microchemical spot tests, but the latter species is distinguished by the I⁺ blue medulla, the *dispersa*-type exciple and the presence of atranorin.

Buellia maharajensis also shows similarity with *B. subhemispherica* Ngangom & Nayaka and *B. vizagensis* Ngangom & Nayaka in morphology, chemical spot tests and UV reaction. However, these two species can be distinguished by the following characteristics: *B. subhemispherica* has a *dispersa*-type exciple with pale middle layer, and the outer layer with aeruginose pigments (HNO₃⁺ violet), as well as the presence of narrower ascospores (9–13 × 4–6 µm), while *B. vizagensis* has a *leptocline*-type exciple containing aeruginose pigments (HNO₃⁺ violet), and both species have an amyloid medulla (Ngangom *et al.*, 2025). *Buellia maharajensis* also resembles *B. mamillana* (Tuck.) W.A. Weber (Bungartz *et al.*, 2004) in having a rimose areolate and UV⁺ orange thallus, however, the latter species is distinguished by having an amyloid (I⁺ blue) medulla, *mamillana*-type exciple, slightly longer ascospores (12–15 × 6–8 µm), and apart from 4,5-dichlorolichexanthone, norstictic acid, it has various additional lichen compounds, such as atranorin, 4,5-dichloro-3-*O*-methylnorlichexanthone, 4-chlorolichexanthone, 2'-*O*-methylperlatolic acid, divaricatic acid, hypostictic acid, and methylstictic acid (Bungartz *et al.*, 2004). *Buellia maharajensis* further shows some similarities with *Amandinea polyxanthonica* (Elix) Elix (= *Buellia polyxanthonica* Elix) in having a rimose areolate thallus,

but the latter species has a yellow to deep yellow-green thallus, longer ascospores (12–20 × 6–8 µm), and various xanthenes (Elix, 2009). The thallus *B. maharajensis* shows some similarities with *B. halonia* (Ach.) Tuck. in having UV⁺ yellow to orange thallus, however, the latter species differs in having C⁺ orange thallus, *leptocline* type exciple (Bungartz *et al.*, 2004). The thallus of *B. subaethalea* B. de Lesd. also gives a UV⁺ dark-orange reaction, however, it differs from *B. maharajensis* in having granular areolate to verrucose, pale yellowish green thallus, larger ascospores (14–18 × 7–9 µm) and various lichen compounds (Bungartz *et al.*, 2008). Finally, *Buellia maharajensis* is morphologically similar to *Amandinea prospera* (Nyl.) Elix & H. Mayrhofer, but the latter has no positive microchemical colour tests and no secondary substances in the thallus.

New records of *Buellia* from Kerala

Buellia hemispherica S.R. Singh & D.D. Awasthi, 1981

Specimens examined: India, Kerala, Idukki, Mathikettan Shola National Park, Sarvekkalpara, 10.005353° N and 77.255434° E, 1809 m elev., on rock, 26 March 2022, *Aswathi Anilkumar* 2851 (MCH); *ibid.*, Shivanpara, 09.9753° N and 77.24481389° E, 1610 m elev., on rock, 26 March 2022, *Aswathi Anilkumar* 2917 (MCH).

Note: This species has been reported earlier from Andhra Pradesh, Madhya Pradesh, Odisha and Tamil Nadu (Sinha *et al.*, 2024). The present collection from the study area shows its presence in Kerala.

Buellia nilgiriensis S.R. Singh & D.D. Awasthi, 1981

Specimens examined: India, Kerala, Idukki, Mathikettan Shola National Park, Karadippara, 10.007983° N and 77.246951° E, 1780 m elev., on rock, 28 April 2022, *Aswathi Anilkumar* 2857 (MCH); *ibid.*, Vellappara, 09.5934° N and 77.1529° E, 1808 m elev., on rock, 26 March 2022, *Aswathi Anilkumar* 5632 (MCH).

Note: This species has been reported earlier from Andhra Pradesh, Rajasthan and Tamil Nadu (Sinha *et al.*, 2024). The present collection from the study area shows its presence in Kerala.

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