

BUELLIELLA INDICA (DOTHIDEOMYCETES), A NEW LICHENICOLOUS SPECIES FROM INDIA

P. SINGH* and K. P. SINGH

Central Regional Centre, Botanical Survey of India
10-Chatham Lines, Allahabad 211 002, Uttar Pradesh, India; *E-mail: pushpisingh08@gmail.com

(Received 6 April, 2018; Accepted 3 September, 2018)

A new lichenicolous fungus *Buelliella indica* colonising on the thallus of *Graphis longiramea* is described from the state of Nagaland, a part of the Indo-Burma biodiversity hotspot region in India. It is characterised by its brown epihymenium, much smaller ascospores with dimensions of 11.5–13.8 × 4.8–6 µm and the new host *Graphis*.

Key words: *Buelliella*, India, lichenicolous fungi, taxonomy

INTRODUCTION

The lichenicolous Dothidealean genus *Buelliella* established by Fink (1935) is represented by 13 species viz. *B. colombiana* Etayo, *B. dirinariae* Diederich, *B. eximia* Kalb et Hafellner, *B. heppiae* van den Boom, *B. inops* (Triebel et Rambold) Hafellner, **B. lecanorae* Suija et Alstrup, **B. minimula* (Tuck.) Fink, *B. nuttallii* (Calk. et Nyl.) Fink, *B. physciicola* Poelt et Hafellner, *B. poetschii* Hafellner, **B. protoparmeliopsis* Etayo et Pérez-Ortega, *B. pusilla* Hafellner and *B. tryptethelii* (Tuck.) Fink ex Hafellner in the world (Aptroot *et al.* 1997, Etayo 2002, Hafellner 1979, 1985, Hafellner *et al.* 2002, 2008, Kalb 1990, Pérez-Ortega and Etayo 2010, Santesson 1994, Suija and Alstrup 2004, van den Boom 2010). Of these, 3 species marked by an asterisk (*) above occur in India. The genus is characterised by its apothecioid ascomata when mature, dark brown paraplectenchymatous exciple, bitunicate ascus, I–, and thin walled, brown, pigmented, 2-celled ascospores. Lichenicolous fungi in India have not been paid proper attention and so far, 104 species are known (Joshi *et al.* 2016, Singh *et al.* 2017). However, in last few years, these fungi have received considerable attention by a few researchers (Joseph and Sinha 2015, Joshi *et al.* 2016, Singh *et al.* 2017, Zhurbenko 2013) who have described new species and prepared a checklist of lichenicolous fungi of the country. During the course of lichenological studies on graphidoid lichens from northeastern states of India under SERB project, an interesting lichenicolous fungus *Buelliella indica* has been discovered from the collections of Nagaland, hitherto not reported on the host genus *Graphis*. This species is clearly distinct from all other known lichenicolous species of *Buelliella* and therefore, deserves to be described here as new species.

Table 1
Comparison of characters of *Buelliella* species having brown epihymenium

Characters	<i>B. heppiae</i> (van den Boom 2010)	<i>B. inops</i> (Suija et Alstrup 2004)	<i>B. lecanorae</i> (Suija et Alstrup 2004)	<i>B. protoparmeliopsis</i> (Pérez-Ortega et Etayo 2010)	<i>B. tryppethelii</i> (Suija et Alstrup 2004)	<i>B. indica</i> Pushpi Singh et Kr. P. Singh (2019)
Ascomata size	0.2–0.5 mm	0.15–0.2 mm	–0.2 mm	0.25–0.54 mm	0.3–0.45 mm	0.17–0.2 mm
Ascospores	23–28 × 10–12 µm	17–19 × 7.5–9.5 µm	16–17 × 6–8 µm	18–21 × 6–10 µm	16–19 × 8–12 µm	11.5–13.8 × 4.8–6 µm
Epihymenium	–	N–	N+ red	N–	N+ red	N–
Host	<i>Heppia arenacea</i>	<i>Lecanora</i> spp.	<i>Caloplaca</i> spp.	<i>Protoparmeliopsis</i> sp.	<i>Tryppethelium</i> spp.	<i>Graphis longiramea</i>
Distribution	Spain	Australia, Mexico and USA	Estonia, India (Joshi et al. 2016) and Ukraine (Kondratyuk et al. 2014)	Chile and India (Joshi et al. 2016)	USA and Guyana	India

MATERIALS AND METHODS

The specimens collected from Nagaland, India, deposited in ASSAM herbarium was examined morphologically and anatomically. Morphological characters of reproductive structures and their colour, size and shape were examined under a stereomicroscope (Nikon SMZ 1500). Thin hand-cut sections of ascomata were mounted in water, 50% HNO₃ (N) and 10% KOH (K) and examined under a compound microscope (Nikon Eclipse 50i). All anatomical measurements were made in water mounts. Ascomata and ascospores were stained with Lugol's solution to check the amyloid reaction.

RESULTS AND DISCUSSION

Buelliella indica Pushpi Singh et Kr. P. Singh, *spec. nova* (Fig. 1)

Mycobank no.: MB 824735.

Differs from other species of Buelliella by its brown epihymenium, smaller, 11.5–13.8 µm long ascospores and lichenicolous habit on the thallus of Graphis longiramea.

Type: India. Nagaland, Phek district, Chozuba road, on *Graphis longiramea*, alt. 1500–1700 m, coll.: K. P. Singh and G. P. Sinha (2971), 16.09.1998 (holotype: ASSAM).

Ascomata apothecioid, rounded, solitary, rarely grouped, sessile, black, 0.17–0.20 mm wide; apothecial margin thin, inconspicuous to be excluded, concolorous with the disc; disc black, epruinose, plane to slightly concave; exiple paraplectenchymatous, dark brown, 15–20 μm thick, continuous below the subhymenium, K–; hymenium hyaline to pale brown, 40–50 μm high, I–; epihymenium brown, K–, N–; subhymenium hyaline; paraphysoids thin, up to 1.5–2 μm wide, branched and anastomosing, widened and brown pigmented apically; asci 8-spored, cylindrical to clavate, bitunicate, with distinct ocular chamber when young, I–, 30–40 \times 16–20 μm ; ascospores initially hyaline, becoming pale brown, 1-septate, rarely with 1–2 additional septa, smooth, thin walled, constricted at the medium septum, upper cell broader than lower cell, without ornamentation or perispore, with few oil droplets in each cell, 11.5–13.8 \times 4.8–6 μm ; conidiomata not observed.

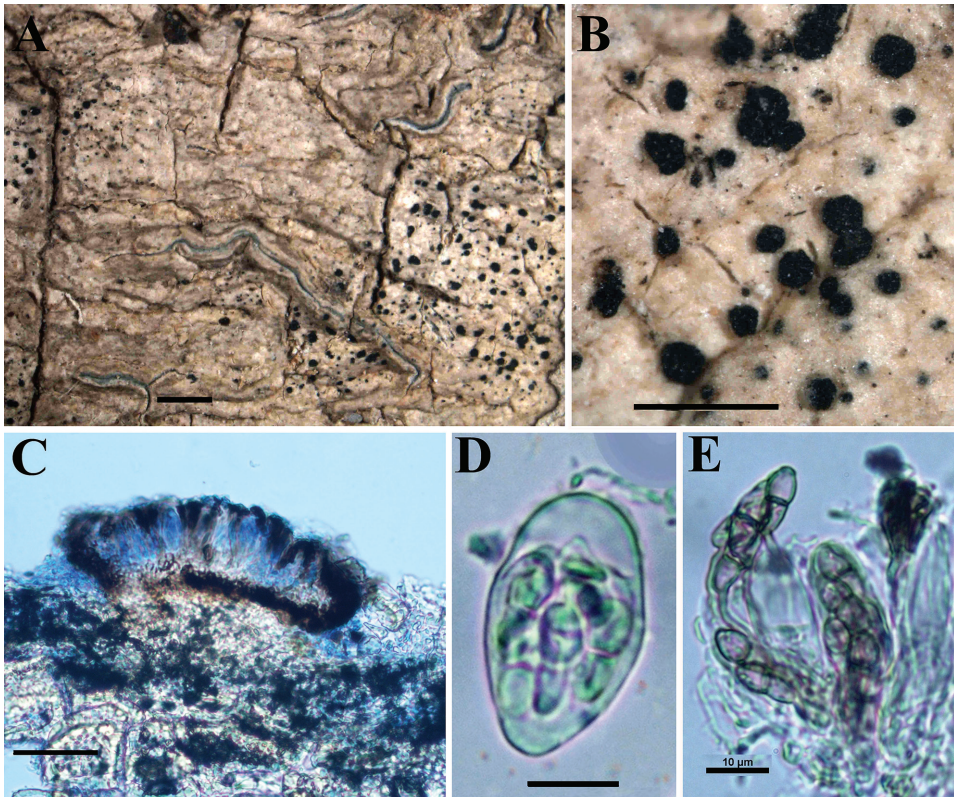


Fig. 1. *Buelliella indica* (holotype). A–B = ascomata of *Buelliella indica* on *Graphis longiramea*; C = cross section through an ascoma; D = ascospores in an ascus; E = mature ascospores in asci. Scale bar: A–B = 1 mm; C = 100 μm ; D–E = 10 μm

Host: Lichenicolous on thallus and ascomata of *Graphis longiramea*. It seems to be commensalistic on host and does not harm the host.

Etymology: The species epithet refers to the name of the country where the new species is described from.

Ecology and distribution: The new species is known only from the type locality, growing abundantly on the host species *Graphis longirameae*, scarcely distributed in the area.

Taxonomic remarks: So far, five species, viz. *Buelliella heppiae*, *B. inops*, *B. lecanorae*, *B. protoparmeliopsis* and *B. tryphethelii* have been reported to have brown epihymenium. The new species also has brown epihymenium and can readily be distinguished from the above-mentioned species by its smaller ascospores and its host. The comparison of some selected characters of *Buelliella* species, possessing brown epihymenium along with new species is provided in Table 1.

*

Acknowledgements – The authors are thankful to Director, Botanical Survey of India, Kolkata for encouragement and to Head of Office, Botanical Survey of India, Central Regional Centre, Allahabad for facilities. We thank two anonymous reviewers for useful comments and suggestions on the manuscript. One of the authors (PS) is thankful to Science and Engineering Research Board (SERB) under N-PDF scheme (PDF/2016/002035) for the financial assistance.

REFERENCES

- Aptroot, A., Diederich, P., Sérusiaux, E. and Sipman, H. J. M. (1997): Lichens and lichenicolous fungi from New Guinea. – *Bibl. Lichenol.* **64**: 1–220.
- Etayo, J. (2002): Aportación al conocimiento de los hongos liquenícolas de Colombia. – *Bibl. Lichenol.* **84**: 1–154.
- Fink, B. (1935): *The lichen flora of the United States*. – University of Michigan Press, Ann Arbor, 426 pp.
- Hafellner, J. (1979): Karschia. Revision einer Sammelgattung an der Grenze von lichenisierten und nichtlichenisierten Ascomyceten. – *Beih. Nova Hedwigia* **62**: 1–248.
- Hafellner, J. (1985): Studien über lichenicole Pilze und Flechten IV. Die auf Brigantiaea-Arten beobachteten Ascomyceten. – *Herzogia* **7**: 163–180.
- Hafellner, J., Herzog, G. and Mayrhofer, H. (2008): Zur Diversität von lichenisierten und lichenicolen Pilzen in den Ennstaler Alpen (Österreich: Steiermark, Oberösterreich). – *Mitt. Naturwiss. Verein. Steiermark* **137**: 131–204.
- Hafellner, J., Triebel, D., Ryan, B. D. and Nash III, T. H. (2002): On lichenicolous fungi from North America II. – *Mycotaxon* **84**: 293–329.
- Joseph, S. and Sinha, G. P. (2015): The lichenicolous species of Melaspilea (Melaspileaceae) in India. – *Taiwania* **60**: 18–22. <https://doi.org/10.6165/tai.2015.60.18>
- Joshi, Y., Falswal, A., Tripathi, M., Upadhyay, S., Bisht, A., Chandra, K., Bajpai, R. and Upreti, D. K. (2016): One hundred and five species of lichenicolous biota from India: an updated checklist for the country. – *Mycosphere* **7**(3): 268–294. <https://doi.org/10.5943/mycosphere/7/3/3>

- Kalb, K. (1990): *Lichenes neotropici*. – Fasc. XI (No. 451–475).
- Kondratyuk, S., Lőkös, L. and Hur, J. S. (2014): New lichen-forming and lichenicolous fungi from Ukraine. – *Acta Bot. Hung.* **56**(3–4): 361–368. <https://doi.org/10.1556/ABot.56.2014.3-4.11>
- Pérez-Ortega, S. and Etayo, J. (2010): *Labrocarpon* gen. nov. for *Melaspilea canariensis*, with the description of *Buelliella protoparmeliopsis* sp. nov. from South America. – *Lichenologist* **42**(3): 271–276. <https://doi.org/10.1017/S0024282909990624>
- Santesson, R. (1994): Fungi lichenicoli exsiccati. Fasc. 7 and 8 (Nos 151–200). – *Thunbergia* **21**: 1–18.
- Singh, P., Joshi, Y. and Singh, K. P. (2017): A new lichenicolous species of *Melaspilea* (Melaspileaceae, Arthoniales) from India. – *Acta Bot. Hung.* **59**(3–4): 439–443. <https://doi.org/10.1556/034.59.2017.3-4.9>
- Suija, A. and Alstrup, V. (2004): *Buelliella lecanorae*, a new lichenicolous fungus. – *Lichenologist* **36**(3–4): 203–206. <https://doi.org/10.1017/S0024282904014239>
- van den Boom, P. P. G. (2010): New or interesting lichens and lichenicolous fungi of Gran Canaria (Canary Islands, Spain). – *Willdenowia* **40**: 359–367. <https://doi.org/10.3372/wi.40.40215>
- Zhurbenko, M. P. (2013): A first list of lichenicolous fungi from India. – *Mycobiota* **3**: 19–34. <https://doi.org/10.12664/mycobiota.2013.03.03>

