KAVAKA 60(4): 70-77 (2024) DOI: 10.36460/Kavaka/60/4/2024/70-77

New Species and New Records of Lichenicolous Fungi from India

Yogesh Joshi[1 *], Sunita Bisht[1,2], Pooja Bansal[1] and Shimmi Meena[1]

[1]*Department of Botany, University of Rajasthan, Jaipur - 302 004, Rajasthan, India.*
[2]*Department of Botany, M.B. Govt. Post Graduate College, Haldwani – 263 139, Nainital, Uttarakhand, India.*

** Corresponding author Email: dryogeshcalo@gmail.com*

(Submitted on December 5, 2024; Accepted on December 13, 2024)

ABSTRACT

Three new taxa of lichenicolous fungi from India namely, *Lichenochora solenopsorae, Stigmidium buelliae* var. *thallinum*, and *Stigmidium solenopsoricola* var. *apotheciorum* along with 6 new records are described and reported from India, thus raising the tally to 282. Each new taxon is thoroughly characterized with detailed descriptions, covering their morphology and anatomy, host specificity, ecological preferences along with comparative notes highlighting similarities and distinctions between these new taxa and related species. Meanwhile, the new records are listed along with their host and distribution in India.

Keywords: Central Himalaya, Western Ghats, Lichenicolous Fungi, New species, New variety, New Records.

INTRODUCTION

India, with its diverse climatic regions and rich biodiversity, has emerged as a hotspot for discovering new species and records of lichenicolous fungi and till date 273 species pertaining to this group are known from India (*pers. comm.*). These specialized fungi, which inhabit lichens as their hosts, have been recorded from various parts of the country, particularly the Himalayas and Western Ghats. In continuation with their studies on lichenicolous fungi in India, the authors have further discovered 3 new taxa: *Lichenochora solenopsorae*, *Stigmidium buelliae* var. *thallinum*, and *Stigmidium solenopsoricola* var. *apotheciorum*, which are described in detail and compared with closely related species. *Lichenochora solenopsorae* and *Stigmidium solenopsoricola* var. *apotheciorum* were discovered in the subalpine regions of the Central Himalaya, where they colonize the thallus and apothecial disc of *Solenopsora candicans* (Dicks.) J. Steiner, respectively. In contrast, *Stigmidium buelliae* var. *thallinum* was found in the Western Ghats, colonizing the thallus of *Buellia*.

Additionally, detailed floristic investigations have resulted in the identification of 5 new records of lichenicolous fungi *viz. Carbonea vorticosa* (Flörke) Hertel, *Cercidospora epipolytropa* (Mudd) Arnold, *C. lobothalliae* Nav.-Ros. & Calat., *Endococcus macrosporus* (Hepp ex Arnold) Nyl., *Sphaerellothecium parietinarium* (Linds.) Hafellner & Volk. John, and 1 new record of lichenicolous lichen *viz. Myriolecis dispersa* (Pers.) Śliwa, Zhao Xin & Lumbsch. These findings underscore the need for continued exploration, as lichenicolous fungi remain an understudied component of India's fungal flora, offering potential insights into co-evolutionary dynamics and ecosystem functioning. These findings not only expand our understanding of lichenicolous fungal biodiversity in India but also highlight the importance of continued exploration and documentation of lichenicolous fungi in the region.

MATERIAL AND METHODS

The specimens that form the basis of this study were collected from Central Himalaya and Western Ghats and are lodged in the herbarium of the Rajasthan University Botanical Laboratory (RUBL), Jaipur, India and the CSIR-National Botanical Research Institute, Lucknow, India (LWG). The accession numbers of the collections are given in parentheses after the locality details. Macroscopic examinations were conducted using a Stereozoom dissecting microscope (Olympus SZX10). For microscopic analysis, an Olympus BX53 microscope fitted with Olympus differential interference contrast optics and an Olympus camera was used. Thin razor-blade hand cut sections for studying microscopic characters were prepared under Stereozoom dissecting microscope and mounted in water, 10% KOH (K), lactophenol cotton blue (LCB), Lugol's iodine, directly (I) or after a KOH pre-treatment (K/I), Brilliant Cresyl blue (BCr) and Congo Red (CR). The length, breadth and length/breadth ratio (l/b) of asci, ascospores are given (where n > 10) as: (min–)($\bar{x}$ –

SD)–($\bar{x}$ + SD)(–max), where 'min'and 'max' are the extreme values observed, $\bar{x}$ the arithmetic mean and SD the corresponding standard deviation, followed by the number of measurements (n). Measurements reported were made on material mounted in water or lactophenol cotton blue.

RESULTS AND DISCUSSION

NEW TAXA

Lichenochora solenopsorae Y. Joshi *sp. nov.*

Figure 1

MycoBank No.: MB 856965

Diagnosis: Differs from *Lichenochora collematum* Nik. Hoffm. & Hafellner in the smaller and narrower ascospores and a different host.

Etymology: The choice of the name reflects the species-specific association with *Solenopsora candicans*, the lichen on which it was discovered.

Type: INDIA. Uttarakhand, Pithoragarh district, Dharchula, Vyas valley, on way to Kuti village, 30°12'38"N, 80°49'44"E, alt. 3284 m, on thallus of *Solenopsora candicans*, 24 October 2023, *Sunita Bisht 00181* (holotype, RUBL 21692).

Description: *Vegetative hyphae*: inconspicuous. *Ascomata*: perithecia, subglobose, 325–375 µm diam., with a distinct neck, ostiolar opening indistinct, erumpent, arising singly. *Exciple:* 30–40 µm thick, dark brown, paraplectenchymatous. *Hamathecium:* hyaline, highly inspersed, I–. *Periphyses*: 15–30 × 1.5–2 µm, persistent. *Paraphyses*: 40–50 × 2–3 µm, hyaline, septate, simple to slightly branched, mostly dissolving in mature perithecia. *Asci*: elongate, unitunicate, 8-spored, I+ red brown, (43.0–)46.14–56.08(–60.0) × (4.0–)5.11–8.65(–9.0) µm (n = 50). *Ascospores*: simple, hyaline, narrowly ellipsoid, thin-walled, non-halonate, irregularly biseriately arranged, with oil droplets, (12.0–)12.85–14.91(–16.0) × (2.0–)2.44–3.40(–4.0) µm, l/b = (3.25–)3.99–5.71(–7.0) (n = 50).

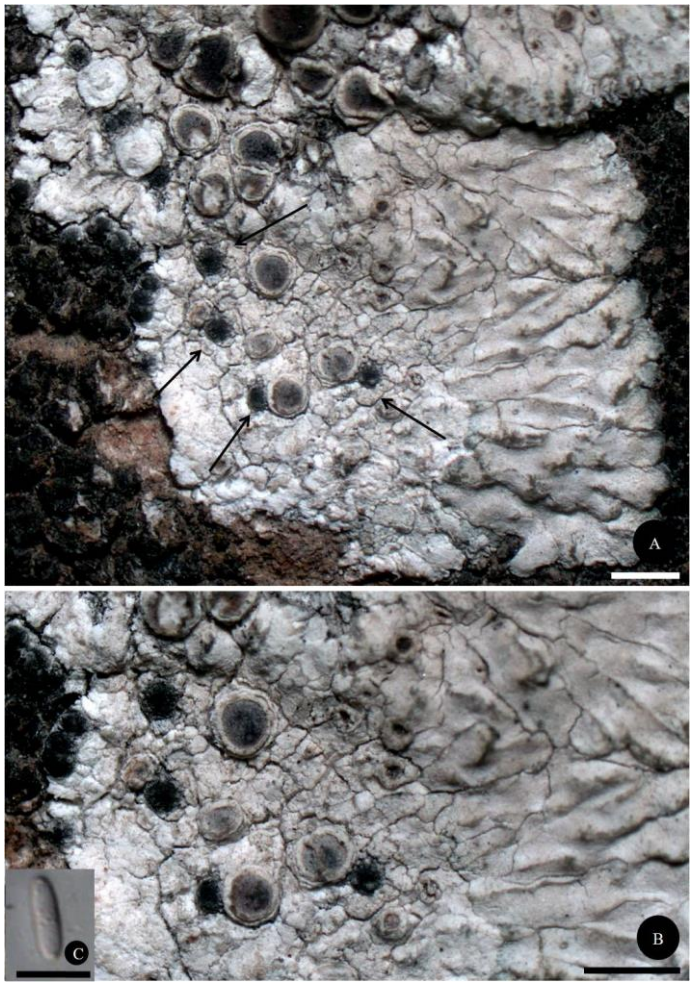

Figure 1: *Lichenochora solenopsorae.* ***a,*** Arrows indicating the presence of *L. solenosporae* on the thallus of *Solenopsora candicans* (scale bar = 1 mm); **b,** Magnified view of the thallus showing perithecia of *L. solenosporae* (scale bar = 1 mm); **c,** Aseptate ascospore (scale bar = 10 µm).

Distribution and ecology: The species is currently known only from its type locality, situated in the Central Himalaya. It was observed on the thallus of a saxicolous species of *Solenopsora candicans*, colonizing rocks in exposed and open habitats of subalpine region. It is growing along with *Stigmidium solenopsoricola* var. *apotheciorum* which was colonizing apothecial disc of the same host. The relationship between the new taxon and its host appears to be commensalistic, as it does not induce galls, discoloration, or any noticeable bleaching on the thallus of the host.

Notes: This species is distinguished by its erumpent, pyriform perithecia that feature an attenuated apex and simple, hyaline ascospores. It is one of only 5 species within this genus known for having simple ascospores. The other 4 species with similar ascospore morphology include *Lichenochora atrans* Halıcı, K. Knudsen & Candan, *Lichenochora collematum*, *Lichenochora thorii* Zhurb. and *Lichenochora verrucicola* (Wedd.) Nik. Hoffm. & Hafellner (Zhurbhenko, 2008; Halıcı *et al*., 2009). Among these, *Lichenochora atrans* and *Lichenochora thorii* are distinguished by their pigmented ascospores and differing host associations. *L. atrans* primarily parasitizes species of *Psora* Hoffm., while *L. thorii* grows on species of *Aspicilia* A. Massal. Additionally, *L. atrans* differs in having larger ascospores [(30.0–)31.75–41.25(–48.0) × (13.0–)14.0–18.0(–21.0) µm], while in *L. thorii*, the perithecia are sessile with a constricted base and also has somewhat bigger ascospores [(10.0–)13.5–17.5(–22.0) × (4.0–)4.5–5.5(–6.5) µm, l/b = (1.7–)2.5–3.7(–4.9)] (Hoffmann and Hafellner, 2000; Zhurbenko, 2008; Halıcı *et al*., 2009).

Lichenochora collematum and *L. verrucicola* are notable for their gall-inducing behavior and distinct host preferences (*Collema* Weber ex F.H. Wigg. and *Aspicilia*, respectively). These species also differ in their ascospore morphology, with *L. collematum* producing ascospores generally longer than 18 µm, ranging from (15.0–)17.0–21.0 × (3.0–)3.3–4.9(–5.0) µm, with a l/b ratio of approximately 4.6. In contrast, *L. verrucicola* exhibits ascospores that are typically larger, measuring (18.0–)19.8–31.8(–38.0) × (6.0–)6.3–11.0(–12.0) µm, with an l/b ratio of about 3.0 (Hoffmann and Hafellner, 2000).

Lichenochora epimarmorata Nav.-Ros. and *L. sinapispermae* Etayo & Nav.-Ros. are 2 species that share a notable similarity in ascospore size, with measurements ranging from 10.0–17.5 µm. Despite this similarity, these species are distinguished by their 1-septate ascospores, and a host specificity, colonizing members of the family Teloschistaceae Zahlbr. *L. epimarmorata* is found on *Xanthocarpia marmorata* (Bagl.) Frödén, Arup & Søchting, while *L. sinapispermae* is associated with *Bryoplaca sinapispermae* (DC.) Søchting, Frödén & Arup. (Navarro-Rosinés *et al.,* 1998; Navarro-Rosinés and Etayo, 2001).

Stigmidium buelliae* var. *thallinum Y. Joshi *var. nov.* **Figure 2**

MycoBank No.: MB 856964

Diagnosis: Similar to *Stigmidium buelliae* var. *buelliae* Zhurb. & Himelbrant in its preference for the same host genus. However, unlike *S. buelliae* var. *buelliae* which typically infects the hymenium, *S. buelliae* var. *thallinum* colonizes the thallus of its host, marking a distinct difference in the site of infection. Furthermore, while *S. buelliae* var. *buelliae* is associated with corticolous lichens, this taxon is found on saxicolous lichen, indicating a preference for rocky substrate over bark. This taxon also exhibits differences in ascus dimensions and ascospore morphology.

Etymology: The name is derived from the infected part of the host lichen *i.e.* thallus of *Buellia*, which was infected by this taxon.

Type: INDIA. Karnataka, Shivamogga (erstwhile Shimoga), on thallus of *Buellia* species colonizing rocks, 18 October 1956, *D.D. Awasthi 3595* (holotype, LWG-AWAS–1893).

Description: *Vegetative hyphae*: inconspicuous. *Ascomata*: perithecioid, brownish black, shiny, subglobose, 70–90 µm diam., initially with an indistinct ostiole, finally often with a wide opening (30 µm diam.), immersed to mostly semi-immersed or subsessile, dispersed or sometimes adjacent. *Ascomatal wall*: dark brown and 10–20 µm thick above, medium brown to hyaline and 10–15 mm thick below, composed of 2–4 cell layers, the innermost one being subhyaline; in surface view of *textura angularis*, K–, BCr+ blue to bluish green. *Periphyses*: well developed, scarcely septate, 10–15 × 1.5–2.0 µm. Short *pseudoparaphyses* resemble those of type ‘‘a’’ sensu Roux and Triebel (1994). *Hymenial* gel I and K/I–. *Asci*: sublageniform, inflated near

the center, with short or no foot, (21.0–)24.21–34.85(–38) × (9.0–)10.53–15.53(–17.0) µm (n = 50), 8-spored, wall BCr+ violet, I and K/I– except plasma staining orange. *Ascospores*: hyaline, narrowly ellipsoid with equal cells and rounded ends, (9.0–)9.82–11.24(–12.0) × (3.0–)2.84–3.23(–4.0) µm, l/b = (2.5–)3.18–3.78(–4.0) (n = 50), with one median septum, constricted at the septum, usually with two large guttules per cell (pseudotetrablastic), non-halonate, smooth-walled, irregularly 2 or 3-seriate in an ascus, wall BCr+ violet.

Distribution and ecology: The species is currently known only from its type locality, situated in the Shimoga region of the Western Ghats. It was discovered growing on the thallus of a saxicolous species of *Buellia*, with the collection occurring during a single survey of the area. The relationship between the new taxon and its host appears to be commensalistic, as it does not induce galls, discoloration, or any noticeable bleaching on the thallus of the host.

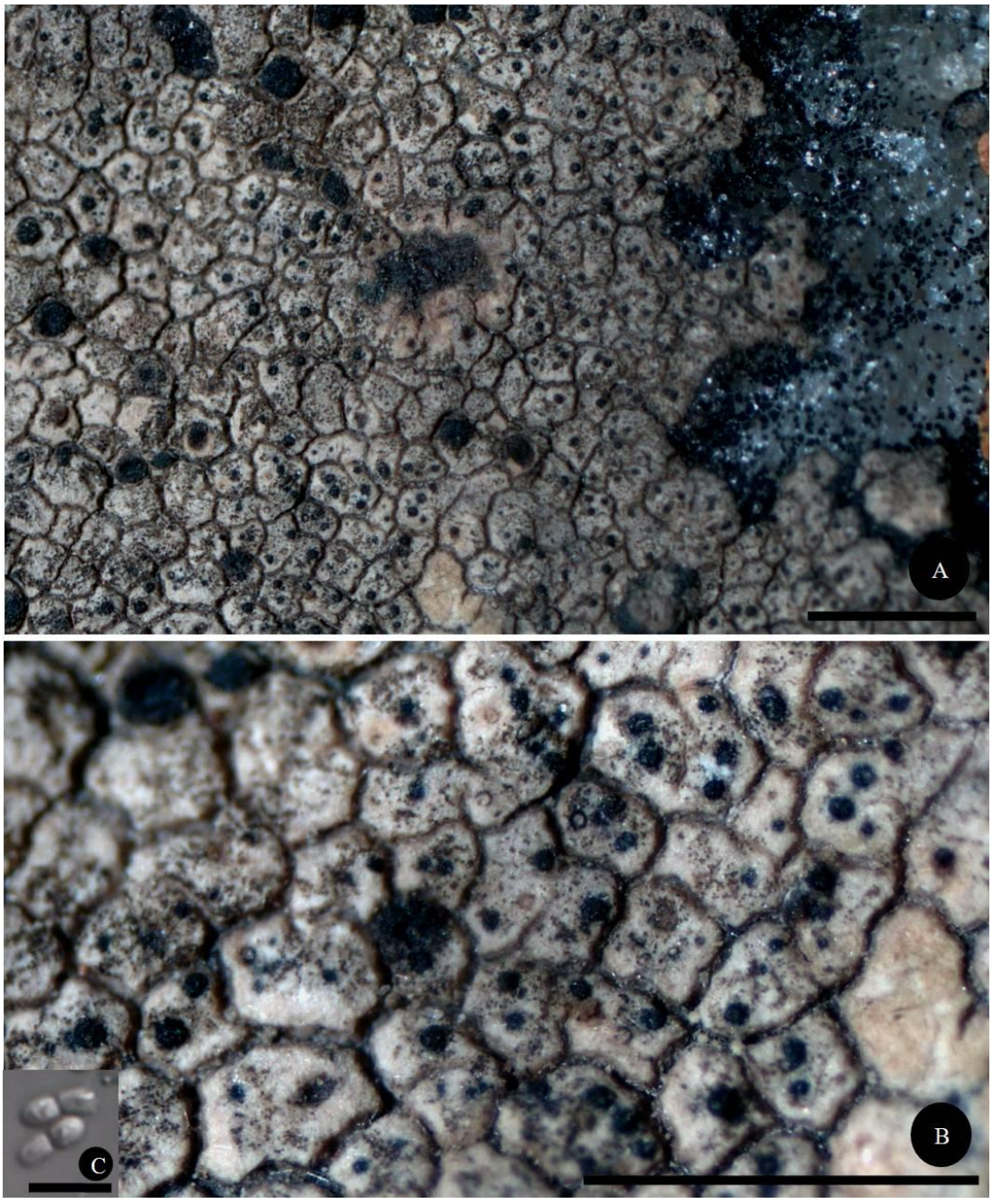

Figure 2. *Stigmidium buelliae* var. *thallinum*. ***a.*** Habitat (scale bar = 1 mm); **b.** Magnified view of thallus of *Buellia* infected with *S. buelliae* var. *thallinum* (scale bar = 1 mm); **c.** Ascospores (scale bar = 10 µm).

Notes: A species of *Stigmidium* Trevis., *Stigmidium buelliae* var. *buelliae*, has previously been reported from Russia, where it was found colonizing the hymenium of a corticolous *Buellia* i.e. *B. disciformis* (Fr.) Mudd (Zhurbenko *et al*., 2012). The newly described taxon *(S. buelliae* var. *thallinum)* shows a close resemblance to *S. buelliae* var. *buelliae* in its host preference for *Buellia*. However, it is distinct in several key aspects, including its habitat, ascus dimensions, and ascospore shape and size. Unlike *S. buelliae* var. *buelliae*, which colonizes the hymenium of corticolous *Buellia disciformis*, the new taxon inhabits the thallus of a saxicolous species of *Buellia*. Moreover, the asci and ascospores in *S. buelliae* var. *buelliae* are significantly larger, measuring (33.0–)36.0–54.0(–71.0) × (10.0–)12.0–16.0(–18.0) µm and (12.5–)14.5–17.5(–22.5) × 3.0–4.0(–5.0) µm, with a l/b = (2.9–)4.0–5.0(–5.7). In contrast, the ascospores of the new taxon are ellipsoid with rounded ends and show a noticeable constriction at the septum. On the other hand, the ascospores of *S. buelliae* var. *buelliae* are oblanceolate to clavate, sometimes almost bacilliform, with a rather acute upper end and a rounded lower end and are without constrictions at septum.

Stigmidium solenopsoricola* var. *apotheciorum Y. Joshi *var. nov.*
Figure 3

MycoBank No.: MB 856966

Diagnosis: Likewise, *Stigmidium solenopsoricola* var. *solenopsoricola* Darmostuk & Guttová, the new taxon shares a preference for the same host, *Solenopsora candicans*, but is distinguished by its unique infection site, targeting the apothecial disc rather than the thallus. Additionally, *S. solenopsoricola* var. *apotheciorum* exhibits smaller ascus and ascospore dimensions, further differentiating it from *S. solenopsoricola* var. *solenopsoricola* colonizing the same host.

Etymology: The name is derived from the infected part of the host lichen *i.e.* apothecia of *Solenopsora*, which was infected by this taxon.

Type: INDIA. Uttarakhand, Pithoragarh district, Dharchula, Darma valley, Sipu village, 30°18'36.48"N, 80°29'33.93"E, alt. 3478 m, on thallus of *Solenopsora candicans, s.d. Krishna Mishra s.n.* (holotype, RUBL 21693).

Description: *Vegetative hyphae*: inconspicuous. *Ascomata:* perithecioid, black, glossy, globose to subglobose, numerous, dispersed to adjacent, 55–75(–80) µm diam., up to 20 per host apothecium, almost completely immersed in host's apothecia to 1/4 exposed, not on thallus and apothecial margin. *Peridium*: pseudoparenchymatous, *Textura angularis*: dark brown above, medium to pale brown to hyaline below, composed of 3–4 layers of cells, K+ bluish green, BCr–. *External periphyses* (sensu Roux and Triebel, 1994) not observed. *Interascal filaments* (paraphysoids): long, branched and anastomosing, with short cells, 1–1.5 µm wide. *Hymenial* gel I–, K/I–. *Asci*: bitunicate, subcylindrical, clavate or obclavate, sublageniform, inflated near the center, with short or no foot, 8-spored, endoascus thickened above (till upper third) with long internal apical beak, (17.0–)18.59–30.41(–36.0) × (5.0–)5.62–11.28(–14.0) µm (n = 50), I–, K/I–, endoascus BCr–, CR+ orange, ascoplast BCr+ blue. *Ascospores*: distichously to irregularly arranged in the asci, 1-septate, constricted at the septum, hyaline to rarely pale brown, with slightly wider upper cell or sometimes ellipsoid and with equal cells, with rounded ends, smooth-walled, without gelatinous sheath, with one guttule per cell, (7.0–)7.91–10.23(–11.0) × (2.0–)2.69–4.07(–5.0) µm, l/b = (2.2–)2.25–3.25(–4.5) (n = 50), wall BCr–. Conidiomata not observed.

Distribution and ecology: The taxon has been documented at 3 distinct localities within Dharchula, situated at elevations ranging from 3270 to 3478 meters in the Central Himalayan region of India. It was observed growing on the apothecial discs of *Solenopsora candicans*, specifically colonizing rocks in exposed and open habitats. The specimen collected in and around Kuti village (RUBL 21692) was also infected with *Lichenochora solenopsorae* which was colonizing the thallus of the same host. These findings highlight the species preference for high-altitude, rocky environments where they establishes themselves on the apothecial disc and thallus of this particular lichen. The relationship between the new taxon and its host seems to be commensalistic, as it does not cause galls, discoloration, or any visible bleaching on the host apothecial disc.

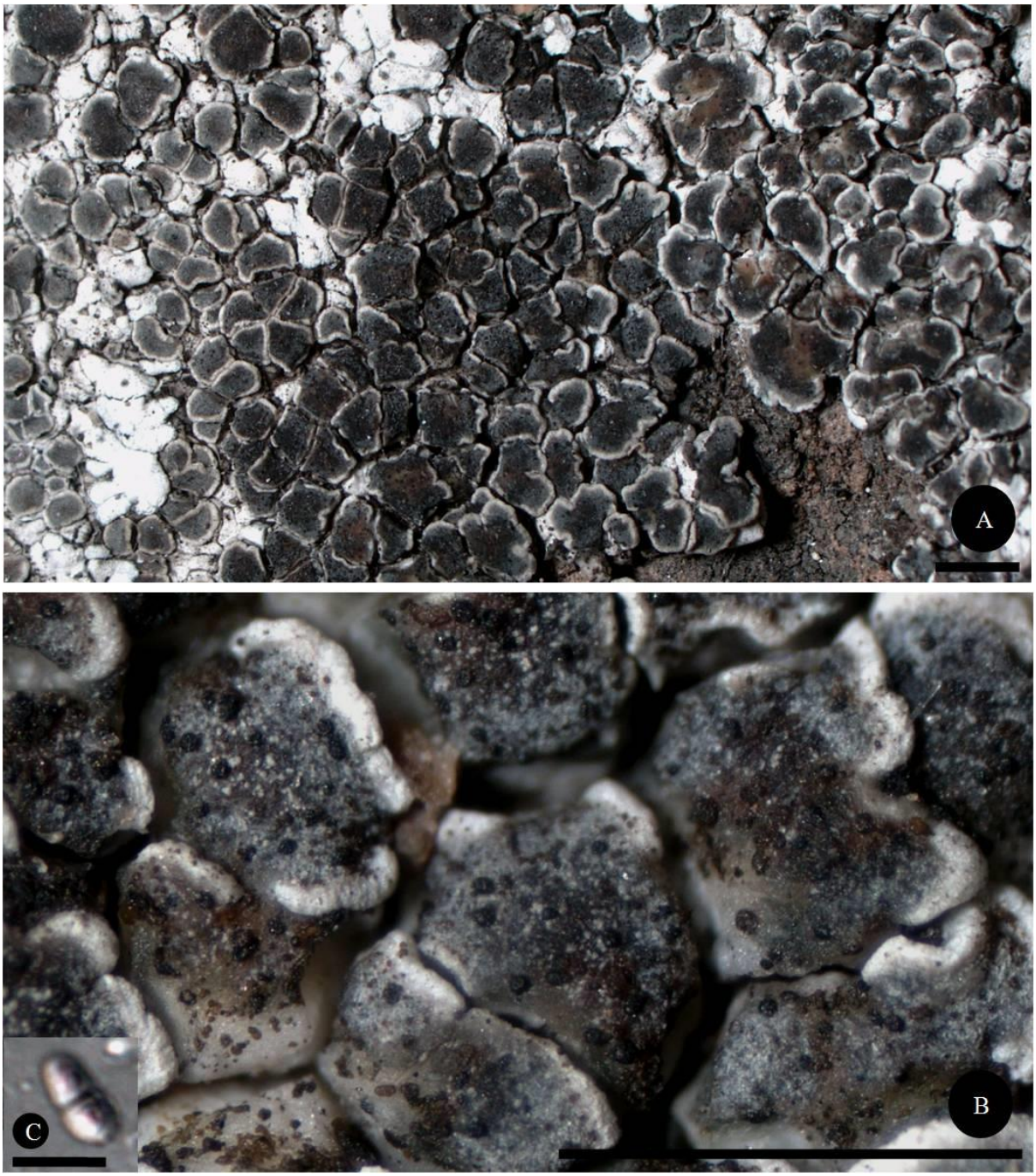

Figure 3: *Stigmidium solenopsoricola* var. *apotheciorum*. ***a.*** Habitat (scale bar = 1 mm); **b.** Magnified view of apothecial disc of *Solenopsora* infected with *S. solenopsoricola* var. *apotheciorum* (scale bar = 1 mm); **c.** Ascospores (scale bar = 10 µm).

Specimens examined: INDIA. Uttarakhand, Pithoragarh district, Dharchula, Darma valley, Sipu village, 30°18'36.48"N, 80°29'33.93"E, alt. 3478 m, on thallus of *Solenopsora candicans*, *s.d.*, *Krishna Mishra s.n.* (RUBL 21694); Vyas valley, on way to Kuti village, 30°12'38"N, 80°49'44"E, alt. 3284 m, on thallus of *Solenopsora candicans*, 24 October 2023, *Sunita Bisht 00181* (RUBL 21692); Nabi village, 30°12'43"N, 80°40'35"E, alt. 3270 m, on thallus of *Solenopsora candicans*, 25 October 2023, *Sunita Bisht 00180* (RUBL 21691).

Notes: The morphological features of *Stigmidium solenopsoricola* var. *apotheciorum* suggest that this variety belongs to the *Stigmidium psorae*-group. It bears a close resemblance to *S. solenopsoricola* var. *solenopsoricola*, which has been documented across various localities in Europe (France, Greece, Italy) and Asia (Jordan)

on thallus of *Solenopsora candicans*, *S. grisea* (Bagl.) Kotlov, and *S. liparina* (Nyl.) Zahlbr. (Darmostuk *et al.*, 2022). However, *S. solenopsoricola* var. *apotheciorum* can be differentiated by several key characteristics. Firstly, the new taxon colonizes the apothecial disc of the host lichen, whereas *S. solenopsoricola* var. *solenopsoricola* typically colonizes the host thalli and apothecial margin, but not apothecial discs. Additionally, the perithecia of the new taxon are smaller in comparison to *S. solenopsoricola* var. *solenopsoricola* [(55–75(–80) µm vs 90–100 µm], respectively. Also, the asci of *S. solenopsoricola* var. *apotheciorum* are narrower, measuring (17.0–)18.59–30.41(–36.0) × (5.0–)5.62–11.28(–14.0) µm in comparison to the broader asci of *S. solenopsoricola* var. *solenopsoricola*, which range from (43.5–)45.0–54.0(–55.5) × (16.0–)18.5–20.5(–23.5) µm. Besides this, the ascospores of *S. solenopsoricola* var. *apotheciorum* are slightly smaller, measuring (7.0–)7.91–10.23(–11.0) × (2.0–)2.69–4.07(–5.0) µm, as opposed to the ascospores of *S. solenopsoricola* var. *solenopsoricola*, which are (11.5–)12.0–14.0(–15.0) × (4.0–)4.5–5.5(–6.5) µm. Furthermore, Darmostuk *et al*. (2022) did not report on the BCr and CR reactions of the ascus and ascoplast of *S. solenopsoricola* var. *solenopsoricola*. Our observations reveal that the new taxon exhibits a BCr–, CR+ orange reaction in the ascus, with the ascoplast showing a BCr+ blue reaction, and the ascospore wall remaining BCr–.

NEW RECORDS

1. *Carbonea vorticosa* (Flörke) Hertel, *Mitteilungen aus der Botanischen Staatssammlung München* 19: 442 (1983).

Host: On apothecial disc of *Physcia*.

Specimen examined: INDIA. Uttarakhand, Chamoli district, Gamsali village, enroute to Gamsali Bugyal, alt. 3392 m, 30°45'27"N, 79°49'19"E, on apothecial disc of *Physcia* colonising rocks, 13 October 2023, *Sunita Bisht 00185* (RUBL 21742).

Remarks: New to India.

2. *Cercidospora epipolytropa* (Mudd) Arnold, Flora (Regensburg) 57: 154 (1874).

Host: On apothecial disc of *Lecanora*.

Specimen examined: INDIA. Uttarakhand, Pithoragarh district, Dharchula, Vyas Valley, Jolingkong near Parvati kund, alt. 4532 m, 30°71'07"N, 80°22'39"E, on apothicial disc of *Lecanora* sp. colonising rocks, 23 October 2023, *Sunita Bisht 00186* (RUBL 21743).

Remarks: New to India.

3. *Cercidospora lobothalliae* Nav.-Ros. & Calat., Lichen Flora of the Greater Sonoran Desert Region 2:637(2004).

Host: On apothecial disc of *Lobothallia.*

Specimen examined: INDIA. Uttarakhand, Pithoragarh district, Dharchula, Darma Valley, in route to Dugtu village to Zero point, alt. 3433 m, 30°14'11"N, 80°30'49"E, on thallus of *Lobothallia* sp. colonising rocks, 5 June 2024, *Sunita Bisht 00187* (RUBL 21744).

Remarks: New to India.

4. *Endococcus macrosporus* (Hepp ex Arnold) Nyl., Bulletin de la Société Botanique de France 25: 504(1880).

Host: On thallus of *Rhizocarpon geographicum*.

Specimen examined: INDIA. Uttarakhand, Pithoragarh district, Dharchula, Darma Valley, in between Dugtu village to Zero-point, alt. 3435 m, 30°14'11"N, 80°30'49"E, on thallus of *Rhizocarpon geographicum* colonising rocks, 5 June 2024, *Sunita Bisht 00188* (RUBL 21745).

Remarks: New to India.

5. *Myriolecis dispersa* (Pers.) Śliwa, Zhao Xin & Lumbsch, Fungal Diversity 78 (1):300 (2015).

Host(s): On thallus of *Acarospora* and *Dermatocarpon.*

Specimens examined: INDIA. Uttarakhand, Chamoli district, Niti village, alt. 3483 m, 30°46'11"N, 79°50'09"E, on thallus of *Dermatocarpon* sp., 10 October 2023, *Sunita Bisht 00189* (RUBL 21741); Pithoragarh district, Dharchula, on way to Payang village from Pasti Village, alt. 2471 m, 29°58'21"N, 80°39'35"E, on thallus of *Acarospora* sp., 1 June 2024, *Sunita Bisht 00190* (RUBL 21742).

Remarks: It is a lichenicolous lichen and was previously reported as lichen from India. For the first time the authors are reporting it as lichenicolous lichen from India.

6. *Sphaerellothecium parietinarium* (Linds.) Hafellner & Volk. John, Herzogia 19:155-176 (2006).

Host: On *Xanthoria parietina.*

Specimen examined: INDIA. Uttarakhand, Pithoragarh district, Dharchula, Vyas Valley, near Rongkong Village, alt. 3262 m, 30°12'09"N, 80°50'13"E, on *Xanthoria parietina* colonising rocks, 24 October 2023, *Sunita Bisht 00191* (RUBL 21746).

Remarks: New to India.

ACKNOWLEDGMENTS

The authors would like to thank The Head, Department of Botany, University of Rajasthan, Jaipur, Rajasthan for providing laboratory facilities. Financial support for this research was graciously provided by the Science and Engineering Research Board (Special Call for Proposals) [SCP/2022/000072]. YJ and SB extend their appreciation to the Principal Chief Conservator of Forests (HoFF), Uttarakhand, for granting permission to collect samples, as per the official communication referenced in Letter no. 2634/5-6 dated 16 May 2023.

CONFLICT OF INTEREST STATEMENT

The authors declare no conflict of interest.

REFERENCES

Darmostuk, V., Fačkovcová, Z., Breidy, J., *et al.*, 2022. *Solenopsora* species (Leprocaulaceae) as hosts of lichenicolous fungi. *Herzogia*, **35(1):**115-130; doi: 10.13158/heia.35.1.2022.115.

Halıcı, M.G., Knudsen, K., Canadan, M. 2009. *Lichenochora atrans* (Phyllachoraceae), a new lichenicolous species on *Psora decipiens* from Turkey. *Mycotaxon*, **109:**239-243; doi: 10.5962/bhl.title.126793.

Hoffmann, N., and Hafellner, J. 2000. Eine Revision der lichenicolen Arten der Sammelgattungen *Guignardia* und *Physalospora* (Ascomycotina). *Bibliotheca Licehnologica*, **77:**1-181.

Navarro-Rosinés, P., Boqueras, M., and Roux, C. 1998. Nuevos datos par el género *Lichenochora* (Phyllachorales, Ascomicetes liquenícola). *Bulletin de la Société Linnéenne de Provence*, **49:**107-124.

Navarro-Rosinés, P., and Etayo, J. 2001. *Lichenochora epinashii* sp. nov. y *L. sinapispermae* sp. nov. (Phyllachorales, Acomicetes), dos nuevos hongos liquenecolas sobre *Caloplaca*. *Cryptogamie Mycologie*, **22(2):**147-158; doi: 10.1016/s0181-1584(01)80006-3.

Roux, C., and Triebel, D. 1994. Révision des espèces de *Stigmidium* et de *Sphaerellothecium* (champignons lichénicoles non lichénisés, Ascomycetes) correspondant à *Pharcidia epicymatia* sensu Keissler ou à *Stigmidium schaereri* auct. *Bulletin de la Société Linnéenne de Provence*, **45:**451-542.

Zhurbenko, M.P. 2008. *Lichenochora thorii* (Phyllachorales), a new lichenicolous ascomycete from Europe. *Nova Hedwigia*, **87:**509-512; doi: 10.1127/0029-5035/2008/0087-0509.

Zhurbenko, M.P., Himelbrant, D.E., Kuznetsova, E.S., *et al.*, 2012. Lichenicolous fungi from the Kamchatka Peninsula, Russia. *The Bryologist*, **115(2):** 295-312; doi: 10.1639/0007-2745-115.2.295