



Some Records of Lichens new to India

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ABSTRACT

Four species of lichens viz. *Leptogium papillosum*, *Melaspilea lentiginosa*, *Physconia pulverulenta*, *Pyrenopsis furfurea* are being described and illustrated from different localities of North-Western Himalayas. Detailed description (morphological and anatomical) along with the chemistry, distribution and substrate specificity are provided.

Key words: Lichen, Taxonomy, Lichenized, Ascomycetes, Diversity, Morphology, Himalayas.

INTRODUCTION

North- Western Himalayan region supports luxuriant growth of biodiversity including fungi and lichens. It includes the states of Jammu and Kashmir, Himachal Pradesh and Uttarakhand of India and this region is rich in biodiversity which is suitable for the growth of lichens. The earlier reports of lichens from North- Western Himalayas are those of Prasher and Jakhal (2007, 2009a, 2009b); Sharma and Jakhal (2005); Prasher *et al.* (2008); Prasher and Chander (2008); Prasher *et al.* (2016). Four species of lichens viz. *Leptogium papillosum*, *Melaspilea lentiginosa*, *Physconia pulverulenta*, *Pyrenopsis furfurea*, collected and identified from Himachal Pradesh (North-Western Himalayas) are being reported as new record for Himalayas/India.

MATERIALS AND METHODS

Various localities of Himachal Pradesh were visited for the collection of the specimens. The field data such as texture, size, colour, macroscopic features and growth forms were noted in the field after Müeller *et al.* (2004). The collected specimens

were placed in polythene bags of suitable size, along with required data viz. collection number, details of locality, host/ substrate, date of collection and name of collector. Spot tests (K, C, KC and P) were performed and Thin Layer Chromatography (TLC) was carried out following Culberson (1972) and Walker and James (1980). The various mountants/stains used for the taxonomic investigation of lichenized fungi are Amann's Lactophenol (used for mounting of microscopic structures), 2% Glycerine (used for mounting of microscopic structures), 5% Potassium hydroxide (used for microchemical tests and softening of the study materials), Melzer's Iodine (used to check amyloidity of the sporulating structures), Distilled water (for observing the natural colour of the study material), 1% Phloxine (used to stain and observe septation in spores and mycelium) cotton blue for staining (Kirk *et al.* 2008). All the lichen specimens have been deposited in the herbarium of Botany Department (PAN), Panjab University, Chandigarh, India.

RESULTS AND DISCUSSION

Leptogium papillosum (B. de Lesd.) C.W. Dodge, Ann. Mo. bot. Gdn 20: 418 (1933). **Fig. 1a**

Thallus saxicolous, foliose, up to 3.5 cm diameter, loosely attached to the substratum, bluish - grey to dark - grey when dry, dark - green translucent, non - glossy and slightly swollen when wet, lobes flat or ascending, orbicular, up to 5 mm wide, margins plane to undulating, thinner than the middle portion, upper surface dull, distinctly wrinkled, densely isidiate; isidia clavate, coralloid branched, darker or concolourous with thallus, lower surface densely tomentose, paler than upper surface, tomentum whitish to pale - brown, hyphae of tomentum anastomosing, homoiomerous, upper cortex one layered thick of paraplectenchymatous cells but at places two cell layered, Photobiont *Nostoc*; thallus K⁺, C⁺, KC⁺, P⁺; apothecia not observed.

Collection examined: India, Himachal Pradesh, Kangra, Dharmsala, Tung, near flowing water, on rock, c. 1500 m, 20 Feb. 2000, Kiran Rana 25502 A (PAN).

Remarks: This species is marked by bluish - grey to dark - grey thallus having wrinkled, clavate, coralloid branched isidiate upper surface. The allied taxon is *L. burnetiae* from which it differs in possessing wrinkled upper surface with clavate, coralloid branched isidia instead of smooth upper surface with simple to coralloid isidia. It is a rarely occurring species in H.P. and is being reported for the first time from India.

Melaspilea lentiginosa (Lydell ex Leight.) Müll. Arg., Mém. Soc. Phys. Hist. nat. Genève 29(8): 19 (1887) **Fig. 1b**

- =*Melanographa lentiginosa* (Lydell ex Leight.) Müll. Arg., Flora, Regensburg 65: 515 (1882)
- =*Opegrapha lentiginosa* Lydell ex Leight., Ann. Mag. nat. Hist., Ser. 2 13: 211 (1854)
- =*Stictographa lentiginosa* (Lydell ex Leight.) Mudd, Man. Brit. Lich.: 226 (1861).

Thallus corticolous, crustose, thin, endophloedal, up to 1.5 cm, ecorticate, rough due to presence of soralia, ash - grey or whitish, firmly attached to substratum, bears numerous gregarious apothecia, photobiont a green alga - *Trentepohlia*; apothecia numerous, small, discoid to irregular, adnate or sessile, disc open, up to 1.8 mm diameter, yellowish - brown to black, thecium smooth, concave, hyaline, thalline exciple thin, incurved after drying, hypothecium hyaline; asci 45.0-56.0 × 12.0-15.0 µm, clavate - cylindrical, apices obtuse, tapering lower down into narrow stem - like base, thin - walled, some times apical wall thickened, bitunicate, 8 - spored, spores biseriate to irregularly arranged; ascospores 14.0-17.50 × 5.25-7.0 µm, ellipsoid, bi - celled, unequally septate, cells

cylindrical (unequal), constricted at septum, smooth, thin - walled with cytoplasmic content aggregated at polar ends, eguttulate, filling most part of the ascus cavity, hyaline to pale - brown; paraphyses up to 1.75 µm wide, filiform, simple, rarely somewhat branched, non - septate, upper cell enlarged up to 3.0 µm, with brownish amorphous mass forming an epithecium, projecting up to 10.5 µm high above tips of asci, hyaline; epithecium distinct, up to 18 µm thick, yellowish - brown.

Collection examined: India, Himachal Pradesh, Shimla, near Medical College, on the bark of *Q. leucotrichophora*, c. 1700m, 08 Nov. 1999, Kiran Rana 25453 A (PAN).

Remarks: *Melaspilea lentiginosa* is rare in the Himalayas. It is characterized by immersed thin thallus, carbonaceous apothecia; ellipsoid, bi - celled, hyaline to pale brown ascospores. A new report for India.

Physconia pulverulenta (Schreb.) Poelt, Nova Hedwigia 9: 30 (1965) **Fig. 1c**

- =*Anaptychia pulverulenta* (Schreb.) A. Massal., Memor. Lich.: 36 (1853)
- =*Borreria pulverulenta* (Schreb.) Mudd, (1861)
- =*Dimelaena pulverulenta* (Schreb.) Norman, Nytt Mag. Natur. 7: 231 (1853)
- =*Hagenia pulverulenta* (Schreb.) De Not., G. bot. ital. 2(1.1): 183 (1846)
- =*Imbricaria pulverulenta* (Schreb.) DC., in Lamarck & de Candolle, Fl. franç., Edn 3 (Paris) 2: 387 (1805)
- =*Lichen angustatus* Hoffm., Enum. critic. lich. europ. (Bern): 77 (1784)
- =*Lichen pulverulentus* Schreb., Spic. fl. lips. (Lipsiae): 128 (1771)
- =*Lichen pulverulentus* Hoffm., Enum. critic. lich. europ. (Bern): 76 (1784)
- =*Lichen pulverulentus* * *angustata* (Hoffm.) Lam., Encycl. Méth. Bot., Suppl. 3: 402 (1813)
- =*Lobaria pulverulenta* (Schreb.) Hoffm., Deutschl. Fl., Zweiter Theil (Erlangen): 152 (1796) [1795]
- =*Parmelia pulverulenta* (Schreb.) Ach., Methodus, Sectio post.: 210 (1803)
- =*Physcia pulverulenta* (Schreb.) Hampe ex Fűrnr., Naturhist. Topogr. Regensburg 2: 249 (1839)
- =*Physcia pulverulenta* f. *angustata* (Hoffm.) Flagey, Mém. Soc. ému. Doubs, sér. 5 7: 462 (1882)
- =*Physcia pulverulenta* (Schreb.) Hampe ex Fűrnr., Naturhist. Topogr. Regensburg 2: 249 (1839) f. *pulverulenta*
- =*Physcia pulverulenta* (Schreb.) Hampe ex Fűrnr., Naturhist. Topogr. Regensburg 2: 249 (1839) subsp. *pulverulenta*
- =*Physcia pulverulenta* var. *angustata* (Hoffm.) Nyl., (1931)

=*Physcia pulverulenta* (Schreb.) Hampe ex Fürnr., Naturhist. Topogr. Regensburg 2: 249 (1839) var. *pulverulenta*

=*Physconia distorta* f. *angustata* (Hoffm.) J. Nowak, Flora Polska, Porosty (Lichenes) (Warszawa-Kraków) 6(3): 31 (1993)

=*Physconia pulverulenta* var. *angustata* (Hoffm.) Versegly, Bot. Közl. 74-75(1-2): 33 (1988) [1987]

=*Squamaria pulverulenta* (Schreb.) Hoffm., Descr. Adumb. Plant. Lich. 1(2): 39 (1789) [1790]

=*Xanthoria pulverulenta* (Schreb.) Horw., Hand-list Lich. Gr. Brit.: 13 (1912)

=*Xanthoria pulverulenta* var. *angustata* (Hoffm.) Horw., Hand-list Lich. Gr. Brit.: 13 (1912).

Thallus corticolous, foliose, loosely attached to the substratum, orbicular, up to 8 cm diameter, lobes radiating, separate to overlapping, up to 2 mm wide, secondary lobules may arise in the centre of the thallus, grey, ash - grey to grey - brown when dry but green when moist, covered with earthy white dense granular pruina, lower surface black in the centre but whitish towards lobe apices, rhizinate, rhizinae form a dense mat, black, squarrosely branched (bottle brush - like), heteromerous, corticate on both the surfaces, upper cortex plectenchymatous; cortex and medulla K⁻, C⁻

KC⁻, P⁻, photobiont a green alga - *Trebouxia*; apothecia laminal, lecanorine, numerous, scattered or crowded in groups of 4-5 or more, discoid, up to 1.5 mm diameter, thalline exciple granular pruinose, hypothecium distinct, hyaline; asci 52.5-63.0 × 12.25-15.75 µm, clavate - cylindrical, apices obtuse and narrow stem - like base, 8-spored, spores irregularly arranged; ascospores 23.0-30.0 × 10.5-17.5 µm, ellipsoid, bi - celled, *Physconia* - type, evenly thick - walled with large locules, brown; paraphyses moniliform, up to 2.0 µm thick, simple, branching towards apex, septate, upper cell up to 7.0 µm wide, impregnated with brownish amorphous matter forming a distinct epithecium; pycnidia frequent, immersed in small, up to 0.2 mm diameter warts, conidia 4.0-6.0 × 1.0-1.5 µm, bacilliform, simple, hyaline.

Collection examined: India, Himachal Pradesh, Sangla, on the bark of *P. armeniaca*, c. 2680 m, 01 May 2002, Kiran Rana 28036 (PAN).

Remarks: *Physconia pulverulenta* is marked by foliose, pruinose thalli having secondary lobules; apothecia with dense granular pruina, rhizinate underside, squarrosely branched (bottle brush - like) rhizinae forming a dense mat, large sized asci, ellipsoid, bi - celled, thick - walled and brown ascospores. It is being reported for the first time from India.

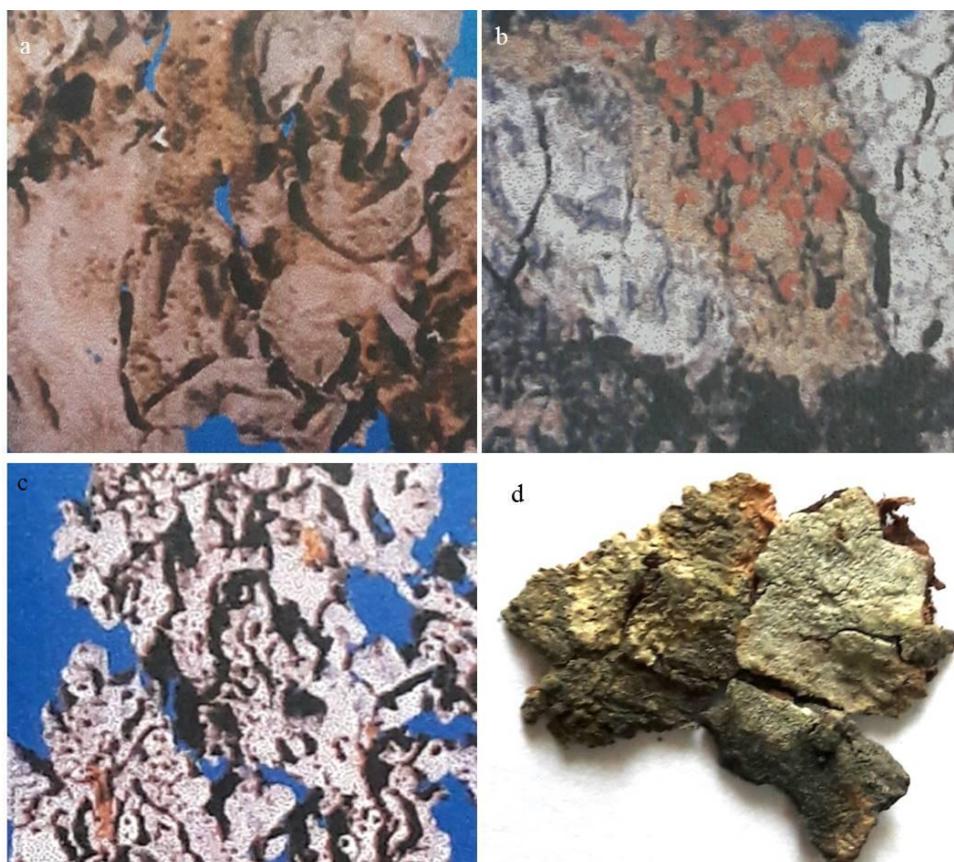


Fig. 1. a) *Leptogium papillosum*. b) *Melaspilea lentiginosa*. c) *Physconia pulverulenta*. d) *Pyrenopsis furfurea*.

Pyrenopsis furfurea (Nyl.) Th. Fr., Bot. Notiser: 58 (1866) **Fig. 1d**
 =*Collema furfureum* Nyl., J. Bot., Lond. 3: 286 (1865)
 =*Pyrenopsidium furfureum* (Nyl.) Forssell, Nova Acta R. Soc. Scient. upsal., Ser. 3 13(no. 6): 61 (1885)
 =*Pyrenopsidium homoeopsis* (Nyl.) Forssell, Nova Acta R. Soc. Scient. upsal., Ser. 3 13(no. 6): 61 (1885)
 =*Pyrenopsis homoeopsis* Nyl., Flora, Regensburg 51: 342 (1868).

Thallus corticolous, crustose, cracked to areolate, granulose, granules effuse, sometimes minutely squamulose, up to 1 cm diameter, ash - grey to black, reddish and gelatinous when moist, cortex undifferentiated and paraplectenchymatous, photobiont a green alga - *Gloeocapsa*; apothecia numerous, lecanorine, innate and partly closed, become urceolate, small, sessile, restricted towards centre, up to 0.6 mm diameter, orange brown, buff or black, thalline exciple prominent: proper exciple thin, inconspicuous, concolorous with thallus, smooth, hyaline, hypothecium hyaline; asci 52.0-73.50 × 6.0-7.5 µm, clavate- cylindrical, obtuse apices, tapering lower down into narrow stem - like base, thin - walled, tholus I⁺ blue, 8 - spored, spores biserially arranged; ascospores 10.50-14.0 × 5.80-7.0 µm, ellipsoid to globose, simple, smooth, thin - walled, eguttulate, hyaline; paraphyses up to 1.17 µm thick, filiform, simple to branched, forked and moniliform in apical region, septate, septa at shorter intervals, apical cell up to 1.2 µm wide, projecting up to 7.0 µm above the tips of asci, hyaline; epithecium brown.

Chemistry: K⁻, P⁻, C⁻, KC⁻, UV⁻; No lichen substance present in TLC.

Collections examined: India, Himachal Pradesh, Shimla, Tara Devi, on tree, 03 Oct. 2013, Sushma 31613 (PAN); India, Himachal Pradesh, Solan, Kasauli, c. 1950 m, on the bark of *C. deodara*, 29 Aug. 1999, Kiran Rana 25421 (PAN).

Remarks: It is marked by deeply cracked - areolate to sometimes minutely squamulose thallus and urceolate apothecia. Allied taxon is *P. rhodosticta* (Tayl.) Müll. Arg. which differs in having perithecioid apothecia. The present collection resembles a typical *P. furfurea* in morphology and anatomical features, however, the thallus is found on *C. deodara*. This species represents a new record for India.

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