

MACROLICHENS OF MUSSOORIE HILLS, UTTAR PRADESH

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ABSTRACT

The paper deals with 35 taxa of macrolichens collected from the Mussoorie hills. Short notes about each species are given.

INTRODUCTION

Mussoorie hills are situated in the outer Himalayas in the district of Dehradun, U.P., at an approximate 30°27' N latitude and 38°61' E longitude, and the town of Mussoorie lies at a distance of about fourteen miles from Dehradun. The hills cover an area of about 30 km with an elevation from 1800 m to 3000 m and rise from Sivaliks of Dehradun. The average annual rain fall in Dehradun district is about 170 cm, but that of Mussoorie is over 170 cm.

The climate of Mussoorie hills in general is temperate. The vegetation is dominated by trees of *Quercus*, *Viburnum*, *Rhododendron*, *Cedrus*, *Abies* and *Picea*. At lower elevation *Pinus* is generally present.

In order to assess the lichen flora from Mussoorie hills, an intensive collection was made by the junior author in October 1975 between the altitudes of 1500 m to 2800 m from the following different localities: Kempty Fall (1500 m—2000 m), Mossy Fall (1500-2000m), Municipal Garden, Chammer Khadd, Bunkteshwar temple, Chaman estate, Malakak estate (alt. ca 2000 m), Jharipani and Barlowgunj area (1500-1700 m), Landour and American hospital area (2000—2500 m) and Lal Tibba (2500-2800m). The collected specimens were later examined at Botany Department, Lucknow University, Lucknow and are preserved in its herbarium (LWU). The numbers in parentheses refer to their collection numbers. Besides these, other specimens preserved in Herb. Awasthi have also been studied.

In all the localities, lichens were generally found growing on tree trunks and rocks but some taxa are also found on ground and stones.

The common taxa are *Parmelia meizospora*, *Parmelia nilgherrensis*, *Parmelia cirrhata*, *Leptogium pedicellatum*, *Heterodermia diademata*, *Physcia hispidula*. Their frequency increases with increase in altitude within the area. Besides the above mentioned species *Leptogium burnetiae*, *Parmelia exsecta* and *P. reticulata* are also found in greater abundance at slightly higher altitude. The fruticose forms are few but occur in all the localities and belong to *Ramalina* and *Usnea*. At higher altitudes within the area crustose forms of genera *Lecanora*, *Lecidea*, *Bacidia*, *Buellia*, *Endocarpon*, *Caloplaca*, and some genera of family Graphidaceae, and some foliose forms like *Parmelia borrieri*, *P. flaventior*, *P. nepalensis*, and *P. wallichiana* were generally seen to be more common.

The 35 taxa of foliose and fruticose forms here referred to macrolichens have been enumerated below according to the system of ZAHLBRUCKNER (1926), the species within the genera being in alphabetical order. A key to distinguish the different species within a genus has also been given.

Dermatocarpon vellereum Zschacke

Thallus umbilicate, greyish to brownish, lower surface black, densely covered with villous, rhizinae. On rocks in lower elevations; Mossy Fall (75.041, 75.049, 75.065), Barlow gunj area (75.205), Camal back Road, Seshadri (1953) No. 3734 (Herb. Awasthi).

COLLEMATACEAE

Collema (Wigg.) Zahlbr.

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|---|----|------------------------|
| 1a. Thallus not isidiate, esorediate, spores 27—48 μm long | .. | <i>C. pulcellum</i> |
| 1b. Thallus isidiate, spores 32—56 μm long | .. | <i>C. subflaccidum</i> |

Collema pulcellum Ach. var. **pulcellum**

Thallus greyish brown, homoiomerous, wrinkled, nonisidiate esorediate; apothecia present, proper exciple euparaplectenchymatous, spores colourless, fusiform transversely septate, 27-48 \times 5-8 μm in size. Corticolous; Municipal Garden (75.070, 75.107, 75.137), Lal Tibba (75.360).

Collema subflaccidum Degel.

Thallus brownish black to black, smooth to rough, densely isidiate, isidia globular, apothecia rare, proper exciple euparaplectenchymatous, spores colourless, fusiform to acicular, straight to curved, 5-7 septate, 32-56 \times 4-6 μm in size. Corticolous, common in the area; Municipal Garden (75.087, 75.110, 75.121, 75.127), Chammer Khadd (75.147, 75.152, 75.163), Jharipani forest (75.173), Bunkteshwar Temple (75.221, 75.237, 75.242), Chaman estate (75.273).

Leptogium (S. Gray) Zahlbr.

In the collection, specimens of only section *Mallotium* (Ach.) Vain. characterised by the presence of tomentum on underside have been found.

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|--|----|---------------------------|
| 1a. Thallus not isidiate, esorediate. | | |
| 2a. Apothecia shortly stalked, without trichomes, spores 22—32 μm long | .. | <i>L. pedicellatum</i> |
| 2b. Apothecia sessile with trichomes | | |
| 3a. Spores 20—27 μm long, trichomes well developed | .. | <i>L. trichophorum</i> |
| 3b. Spores 25—41 μm long, trichomes minute | .. | <i>L. cfr. arisanense</i> |
| 1b. Thallus isidiate | | |
| 4a. Thallus bluish grey, 95—160 μm thick, isidia cylindrical, simple to coralloid | .. | <i>L. burnetiae</i> |
| 4b. Thallus brown black 180—330 μm thick, isidia granular | .. | <i>L. saturninum</i> |

Leptogium cfr. arisanense Asah.

Thallus greenish brown to brownish black, 95-170 μm thick; esorediate, nonisidiate, lower side covered with tomenta, apothecia large, sessile covered with hairs, spores muriform, colourless, 25-41 \times 9-15 μm in size. Corticolous, common in dense and shady areas; Municipal Garden (75.025), Chammer Khadd (75.151), Barlow gunj area (75.195), Bunkteshwar Temple (75.233, 75.234).

Leptogium burnetiae Dodge

Thallus bluish grey to dark grey, 95—160 μm , thick, isidiate, isidia cylindrical coralloid; esorediate, sterile. Corticolous, in shady, moist places; Kempty Fall (75.025),

Mossy fall (75.060), Municipal Garden (75.120, 75.122), Bunkteshwar Temple (75.232), (75.241), and Mussoorie (no precise locality), Awasthi 3829 (Herb. Awasthi).

Leptogium pedicellatum P.M. Jorg.

Thallus grey, 110—165 μm thick; nonisidiate, esorediate, apothecia shortly stalked, spores colourless, muriform, $22\text{-}32 \times 9\text{-}13 \mu\text{m}$ in size. Corticolous, widely distributed, common in all localities; Kempty Fall (75.005, 75.009), Mossy Fall (75.043), Municipal Garden (75.101, 75.108, 75.123), Chammar Khadd (75.156), Barlow ganj area (75.191), Malakak estate (75.252, 75.262, 75.274, 75.275), Lal Tibba (75.328, 75.335, 75.341, 75.375, 75.379), Landour, Awasthi 1450, 1446, 3414, 3831 (Herb. Awasthi).

Leptogium saturninum (Ach.) Nyl.

Thallus brownish black, 180—330 μm thick, esorediate, isidiate, isidia granular to more or less branched, sterile. Corticolous, Jharipani forest (75.171).

Leptogium trichophorum Müll Arg.

Thallus grey, 213—250 μm thick, trichomes present on upper surface of thallus and margin of apothecia; apothecia sessile, spores colourless, muriform $20\text{-}27 \times 9\text{-}12 \mu\text{m}$ in size. Mussoorie, Awasthi 3828 (Herb. Awasthi).

PELTIGERACEAE

Peltigera pruinosa (Gyel.) Inum

Thallus foliose, esorediate, nonisidiate, upper surface etomentose, pale brown, in parts white pruinose, lower surface paler than the upper surface, brown veined and covered also with brown rhizinae. On ground, rare; Mussoorie, Awasthi 3843 (Herb. Awasthi).

PARMELIACEAE

Candelaria concolor (Dicks.) Stein

Thallus yellow, minutely lobed, pruinose, sorediate, soralia marginal, K-, C-, P-. Corticolous, common in shady areas; Kempty Fall (75.036), Municipal Garden (75.069), Chammar Khadd (75.159), Jharipani forest (75.182, 75.188), Barlowgunj area (75.194), Bunkteshwar Temple (75. 248).

Parmelia (Ach.) DeNot.

- 1a. Thallus esorediate and nonisidiate.
 - 2a. Thallus laciniae divaricately divided, tapering, underside \pm canalliculate
 - 3a. Underside with rhizinae *P. nepalensis*
 - 3b. Underside without rhizinae but marginal cilia present *P. cirrhata*
 - 2b. Thallus wide lobate.
 - 4a. Margin of lobes with bulbate cilia, medulla K+red, P+orange *P. meizospora*
 - 4b. Margin of lobes with simple cilia, medulla K—, KC+red, P— *P. nilgherrensis*
- 1b. Thallus sorediate or isidiate
 - 5a. Thallus sorediate
 - 6a. Thallus pseudocyphellate on upper side.
 - 7a. Thallus yellowish green *P. flaventior*
 - 7b. Thallus grey or greyish *P. borrieri*

6b.	Thallus without pseudocyphellae			
8a.	Medulla K + red, P + orange, thallus upper surface reticulately maculated	..	..	.. <i>P. reticulata</i>
8b.	Medulla K—			.. <i>P. sancti-angelii</i>
9a.	Medulla C + red, KC—, soredia farinose	..	..	.. <i>P. exsecta</i>
9b.	Medulla C—, KC + red	..	..
5b.	Thallus isidiate.			.. <i>P. wallichiana</i>
10a.	Medulla K + red, P + orange	..	..	.. <i>P. cfr. pseudotinctorum</i>
10b.	Medulla K—, C + red, KC + red	..	..

Parmelia borneri (Sw.) Turn.

Thallus greyish, characteristic in the possession of pseudocyphellae which develop soredia, underside black, medulla C + red; sterile. Corticolous, scarce; Bunkteshwar Temple (75.240).

Parmelia cirrhata Fr.

Thallus greyish white, narrow, elongated, divaricate-laciniate, convex on upper side with simple marginal cilia, lower surface black without rhizinae, medulla K + red, C—P + orange. Corticolous, widely distributed in the area; Kempty Fall (75.020), Mossy Fall (75.059), Municipal Garden (75.104), Chammer Khadd (75.167), Bunkteshwar Temple (75.272), Malakak estate (75.258) and Lal Tibba (75.323, 75.380).

Parmelia exsecta Tayl.

Thallus mineral grey, pustulate, pustules distinct becoming sorediate, medulla K—, C—, KC + red, Pd—. Corticolous, distributed in shady, moist area; Kempty Fall (75.008), Municipal Garden (75.076, 75.115), Chammer Khadd (75.143), Bunkteshwar Temple (75.239), Chaman estate (75.277), Landour (75.293), Lal Tibba (75.377, 75.338, 75.387).

Parmelia flaventior Stirt.

Thallus yellowish green, sparsely pseudocyphellate, sorediate, rhizinate, medulla K—, C + red, KC + red, P—. Corticolous; Bunkteshwar Temple (75.250), Lal Tibba (75.376).

Parmelia meizospora (Nyl.) Nyl.

Thallus light grey, mineral grey to dark grey, without soredia, isidia and pustules, marginal cilia bulbate, lower surface jet black densely rhizinate, medulla K + red, C—, P + orange, spores 13-20 × 7-9 μm in size.

Thallus corticolous, common; several collections in all localities of the area, distributed in dense, moist and open forest (75.007, 75.026, 75.037, 75.054, 75.116, 75.099, 75.287, 75.132, 75.166, 75.181, 75.192, 75.240, 75.246, 75.257, 75.270)

Parmelia nepalensis Tayl.

Thallus corticolous, subsimilar to *P. cirrhata* but rhizinae present. Malakak estate (75.254).

Parmelia nilgherrensis Nyl.

Thallus large, mineral grey to greenish grey, maculate, margins entire to crenate, marginally ciliate, cilia 1-2 mm long, lower surface black but brown towards the margin; medulla K—, C—, KC + red, P—. Corticolous, common; Municipal Garden (75.077, 75.103, 75.133), Chammer Khadd (75.165), Bunkteshwar Temple (75.229), Malakak estate (75.253), Lal Tibba (75.329, 75.378).

Pramelia cf. **pseudotinctorum** des Abbayes

Thallus whitish mineral grey, adnate with 4-6 mm wide lobes, margins without cilia, upper surface plane, densely isidiate, isidia thick, cylindrical to rarely branched, lower side black without rhizinae, medulla K-, C+pink, KC+red, P-; Chammer Khadd (75.146), American hospital area (75.278). The isidia are thick unlike that of *P. tinctorum*, but at the same time are not typical of *P. pseudotinctorum*, but the lobes are small, adnate to substratum and thallus is corticolous.

Parmelia reticulata Tayl.

Thallus wide lobate, ashy grey, upper side reticulately maculate, marginally sorediate, soralia globular, medulla K+ blood red, C-, P+orange. Corticolous, occurs in moist and shady places; Municipal Garden (75.078), Malakak estate (75.255, 75.262, 75.269, 75.272).

Parmelia sancti-angelii Lynge

Thallus ashy grey to grey, margins entire, marginally ciliate, sorediate, soredia farinose, linear, medulla K-, C+rose red, Pp-. Corticolous; Mossy Fall (75.040), Municipal Garden, (75.131), Chammer Khadd (75.141), American hospital area (75.279).

Parmelia wallichiana Tayl.

Thallus marginally ciliate, and with laminal isidia, medulla K+red, C-, P+orange. Corticolous, rare; Lal Tibba (75.356).

USNEACEAE

Ramalina subcomplanata Nyl.

Thallus fruticose, laciniate, rigid, greenish yellow, laciniae narrow, flattened with white pseudocyphellae. The taxon is both corticolous and saxicolous, widely distributed in the area, common in dense, moist forest, collected from almost all the localities (75.021, 75.106, 75.117, 75.140, 75.150, 75.160, 75.168, 75.260, 75.265, 75.290, 75.330, 75.373, 75.357, 75.358).

Usnea Wigg. em. Ach.

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|--|----|----|----|----------------------|
| 1a. Thallus dark glaucous to brownish, 1—1.5 cm tall | .. | .. | .. | <i>U. subsordida</i> |
| 1b. Thallus pale green to grey up to 5 cm tall | .. | .. | .. | <i>U. luridorufa</i> |

Usnea subsordida Stirt.

Thallus fruticose, dark glaucous in colour, rugose with sparse spinules, papillate, base indistinct, irregularly, 1—1.5 cm; sympodially or subdichotomously branched, branches divergent, apices attenuate, apothecia terminal, medulla K+red, C—, P+orange, I+blue. Corticolous; Lal Tibba (75.331).

Usnea luridorufa Stirt.

Thallus fruticose less than 5 cm tall, pale green to grey, distinctly spinulose, papillate, base indistinct, branched, apices attenuate, esorediate, medulla arachnoid, apothecia terminal, marginally ciliate, medulla K+red, C—, P+orange, I+blue. Corticolous, common in almost all the localities of the area (75.022, 75.050, 75.080, 75.105, 75.170, 75.264, 75.298, 75.322, 75.331, 75.359, 75.372, 75.384).

PHYSICIACEAE

Pyxine Fr.

- | | | | | | |
|--------------------------------------|----|----|----|----|----------------------|
| 1a. Thallus without soredia, fertile | .. | .. | .. | .. | <i>P. berteriana</i> |
| 1b. Thallus sorediate, sterile | .. | .. | .. | .. | <i>P. subcinerea</i> |

Pyxine berteriana (Fée) Imsh.

Thallus pale grey, pruinose, without soredia, isidia and pseudocyphellae; apothecia laminal with thalline margin in young stage, spores mischoblastiomorphic, brown, $14-19 \times 6-9 \mu\text{m}$ in size. Corticolous; Jharipani forest (75.176).

Pyxine subcinerea Stirt.

Lobes pale grey with marginal soralia, pseudocyphellae and pruina present, medulla yellow; sterile. Corticolous; Chammar Khadd (75.148), Bunkteshwar Temple area (75.225).

Physcia (Ach.) Vain.

- 1a. Thallus esorediate and non isidiate
 - 2a. Medulla white, thallus grey *P. dilatata*
 - 2b. Medulla coccineus
 - 3a. Thallus laciniae narrow, less than 1 mm broad .. *P. endococcina*
 - 3b. Thallus laciniae 2—3 mm broad *P. pyrrophora*
- 1b. Thallus sorediate
 - 4a. Thallus laciniae 1—1.5 mm wide, underside densely rhizinate *P. hispidula*
 - 4b. Thallus laciniae 0.3 to 0.7 mm wide, underside without rhizinae *P. orbicularis*

Physcia dilatata Nyl.

Thallus light grey, lobes 2-3 mm broad without soredia and isidia, very thin and fragile. Corticolous, in shady areas; Mossy Fall (75.039), Jharipani forest (75.180), Bunkteshwar Temple (75.238).

Physcia endococcina (Korb) Th. Fr.

Thallus greyish black, laciniae less than 1 mm wide, medulla coccineus, spores *Physcia* type, $19-26 \times 9-11 \mu\text{m}$ in size, medulla K+violet. Corticolous, rare; Municipal Garden (75.126).

Physcia hispidula (Ach.) Frey

Thallus light grey to dark grey, about 1—1.5 m broad, with dense rhizinae projecting beyond the laciniae and crown of cilia below apothecia, thallus sorediate.

The taxon is widely distributed and is common in all the localities of the area on stone, bark and ground (75.012, 75.024, 75.038, 75.045, 75.062, 75.074, 75.081, 75.118, 75.125, 75.136, 175.154, 75.179, 75.187, 75.221, 75.245, 75.256, 75.284, 75.295, 75.326, 75.333, 75.388).

Physcia orbicularis (Neck.) DuR.

Thallus light grey to dark grey (0.3—0.7 mm. broad) partly appressed to substrate, lobes orbicular to broad, sorediate, marginal cilia present, lower surface without rhizinae. Corticolous, common in moist places in Kempty Fall (75.011, 75.013, 75.018).

Physcia pyrrophora Poelt

Thallus pale grey, 2-3 mm. broad, medulla orange K+violet. Corticolous, rare; Mossy Fall (75.055).

Physciopsis elaeina (Sm.) Poelt

Thallus dull grey with maculiform soralia, lower surface shortly rhizinate; sterile. Corticolous; Bunkteshwar Temple (75.223).

Heterodermia Trev. em. Poelt

- 1a. Thallus esorediate, not isidiate
- 2a. Thallus± rosulate not corticated below *H. himalayensis*
- 2b. Thallus adnate corticated below *H. diademata*
- 1b. Thallus sorediate along margin *H. pseudospeciosa*

Heterodermia diademata (Tayl.) Awas.

Thallus large, esorediate, nonisidiate, corticated below, rhizinae irregularly branched, medulla K—, Pd—, both fertile and sterile conditions common. The taxon is both corticolous and saxicolous, (75,009, 75.017, 75,023, 75.045, 75.061, 75.079, 75.113, 75.135, 75. 138, 75.149, 75.161, 75.174, 75.1833, 75.198, 75.224, 75.288, 75.296).

Heterodermia himalayensis (Awas.) Awas.

Thallus esorediate, ecorticate below, marginal cilia present, cortex I+blue, medulla K+red, P+orange; sterile. Corticolous, not common in the area; Chammer Khadd (75.162), American hospital area (75.289).

Heterodermia pseudospeciosa (Kurok.) W. Culb.

Thallus foliose, greyish white, laciniae dichotomously or subdigitately branched, corticated on both sides, soralia marginal, sparsely rhizinate, medulla K+yellow, P+yellow. Corticolous, not common in the area; Barlowgunj area (75.202).

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REFERENCE

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