Lichen genus *Catillaria* s. lat. in India

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**Abstract.** The paper deals with the morphotaxonomic study of 10 species of the lichen genus *Catillaria* s. lat. from India. Three species *Catillaria nilgiriensis*, *Catillaria obscura* and *Catillaria versicolor* are new to science. Certain taxa reported earlier under *Catillaria* from India have been excluded from the present study for the reasons given against each. *Catillaria metaeleptodes* (Nyl.) Zahlbr. and *Catillaria manipurensis* K Singh have respectively been transferred as *Buellia metaeleptodes* (Nyl.) comb. nov. and *Protoblastenia manipurensis* (K Singh) comb. nov.  

**Keywords.** Indian lichens; *Catillaria* s. lat.

1. **Introduction**

The genus *Catillaria* Massal. em. Th. Fr. is placed in the family Lecideaceae by Zahlbruckner (1926) and Poelt (1973), and is characterised by effuse, crustose, non corticated thallus, photobiont a green alga, apothecia innate or sessile, lecideine, margin persistent or excluded, disc concave, plane to convex, hypothecium colourless, coloured or blackish, paraphyses simple, free or agglutinated with the apical cell thickened and brownish pigmented, asci subcylindrical, 8-spored, spores colourless, 2-celled, thin walled, lacking epispore, pycnoconidia elongate-ellipsoid or flask-shaped, straight or curved.

Hafellner (1984) laid emphasis on the structure and nature of the apex of the ascus and placed the genus *Catillaria* s. str. in the family Catillariaceae, which was distinguished 'Asci tholus amyloideis typo designato, gelatina amyloidea circumdati. Paraphyses parce ramosae, apicibus incassatis fusce pigmentosis'. Eriksson and Hawksworth (1987) have accepted the family Catillariaceae with 3 additional genera: *Austrolecia* Hertel, *Placolecis* Trev., and *Xanthopsorella* Kalb and Haf. However, we are treating here the genus *Catillaria* s. lat. as in the majority of taxa treated the tholus shows variation in its thickness even in the same apothecium and that the tholus has a distinct to indistinct ocular chamber. Of the 12 taxa reported so far from the Indian subcontinent (Awasthi 1965; A Singh 1980; K P Singh 1983) 6 species have been excluded for reasons given later against each.

2. **Materials and methods**

The investigations presented in this paper are primarily based on the specimens preserved in the Botany Department, Lucknow University (LWU) and the personal collection of D D Awasthi (Awas.). The type and other authentic specimens have been borrowed from Central National Herbarium, Botanical Survey of India, Howrah (CAL), Conservatoire et Jardin Botanique Genève (G), Botanical Museum, University of Helsinki (H), and Naturhistoriska Riksmuseet, Stockholm (S).

Identifications of the local collections were carried out by the study of the
morphology, anatomy (based on hand sections), and chemistry and their comparison with the type or authentic material. In the cases where such material was not available for comparison, literature sources had to be relied upon. The thin-layer chromatography (TLC) was done in solvent ‘A’ according to the methods of Culberson and Kristinsson (1970) and Walker and James (1980) on silica gel G coated glass plates prepared in the laboratory. Type material was invariably too small for TLC and hence not used.

3. Morphology of thallus and apothecia of Indian taxa

In general, *Catillaria* s. lat. species studied are corticolous, few are lignicolous or saxicolous. The thallus is typically crustose, greyish-white or darker, usually thin and often granular. Photobiont of the genus is reported to be *Dictyochloropsis* or *Trebouxia*, cells of which are in the range of 4–8 (–10) μm diameter. Apothecia are sessile, (0.2–) 0.5–1 (–1.5) mm diameter, varying from brown to black with a concave, plane or convex disc, the margin (exciple) is often characteristic and variable in colour in different species but is always prosoplectenchymatous throughout or at least in the outer part. The hyphae of the exciple are radiating outwards. The cells near the periphery are ± elongate with linear lumina, while inwards the cells are penta- to hexagonal (figures 14, 16–18). The width of the cells is variable from (1.6–) 2.4–8 (–10.5) μm at different stages of the maturity of apothecia, as well as at different levels of exciple and does not seem to be a constant character. In general the lumina of the cells of the exciple below the hypothecium are larger. In the species where the exciple is colourless or yellowish there are minute, hyaline, crystalline inclusions in the exciple. In some cases the region below the hypothecium appears as a compact mass, but becomes loose in K, and the irregular to oblong, hyaline crystals get dispersed. The exciple is narrower at the level of the epithecium but is broader lower down and therefore its width has been taken against the base of hymenium. Furthermore it is variable according to the maturity of the apothecia. The epithecium is brown to blackish-green. The hypothecium is variable from hyaline to brown and exhibits characteristic K + or K – reactions. Asci are typically 8-spored, the apical portion (tholus) is 1+ blue. Majority of species have an indistinct ‘chambre oculaire’ (ocular chamber) and a definite ‘masse axiale’ (axial mass or cushion) (figures 5–7, 19, 21, 23–25). It has not been possible to demonstrate the ocular chamber in the photographs of ascus tips. The spores are typically 2-celled, thin walled, hyaline, and vary in size between (6–) 8–20 (–24) x 4–6 (–10) μm (figures 9–13, 26–31). The paraphyses are simple, capitate, brown pigmented throughout the apical swollen cell as a hood (figures 8, 20, 22). The thickness of paraphyses is ca. 1–6 μm in lower part, while the apical cell is ca. 3–2 μm. Pycnidia are usually inconspicuous and are present only in some cases.

The colour of apothecium, epithecium, hypothecium and their reactions with K have been found useful in distinguishing the different species. Additional characters such as nature of thallus, spore shape and size have also been useful.

4. Chemistry

The presence of fumarprotocetraric acid in one of the species (*C. sikkimensis*) is an interesting find. The other taxa are with or without zeorin and atranorin.
5. **Key to the species**

1a. Thallus saxicolous, apothecia black, hypothecium K−, spores 16–22(−24) × 6–8 μm ............................................. (6-7) *C. nilgiriensis*

1b. Thallus lignicolous or corticolous .................................. 2

2a. Thallus lignicolous, apothecia red-brown to blackish brown, spores (6−) 8–10 × 4–6 μm ............................................. (6-3) *C. erysiboides*

2b. Thallus corticolous .................................................. 3

3a. Apothecial disc black, shiny, margin (exciple) yellowish brown to brown . . . 4

3b. Apothecial disc and margin (exciple) dark brown or black .................. 5

4a. Hypothecium brown, K+ violet, spores (12−) 14–18 (−22) × 4–6 μm .......... (6-6) *C. leptocheiloides*


5a. Apothecia dark brown, hypothecium brown, merged with brown exciple, spores 8–12 × 2–4 μm ............................................. (6-1) *C. cervinofusca*

5b. Apothecia black, hypothecium distinct, not merged with exciple, spores larger ........................................................................ 6

6a. Exciple violet in section, K+ purple, hypothecium pale brown, K−, spores (12−) 14–20 (−22) × 4–6 μm, sometimes with obliquely curved ends ........ (6-5) *C. leptocheila*

6b. Exciple colourless or pale in sections, K− ............................................. 7

7a. Hypothecium K+ violet, spores (12−) 14–18 (−22) × (4−) 6–8 μm .......... (6-4) *C. intermixta*

7b. Hypothecium K− ................................................................. 8

8a. Fumarprotocetraric acid present, apothecia 0.5–1.5 mm in diameter, round, lobed-glomerulate, spores (12−) 18–22 × 4–6 μm ..................... (6-9) *C. sikkimensis*

8b. Fumarprotocetraric acid absent, apothecia smaller, round, not lobed .......... 9

9a. Hymenium bluish-green tinged, hypothecium merging into exciple, spores 12–16 × 2–4 μm ..................................................... (6-8) *C. obscura*

9b. Hymenium hyaline, hypothecium distinct, not merging into exciple, spores 12–16 × 6–8 μm ............................................. (6-10) *C. versicolor*


Type collection: Ins. Andaman, 1867, S Kurz (Holotype: H–NYL 21735) (figure 32).

Thallus corticolous, crustose, brown to brown-black, granular to somewhat furfuraceous. Apothecia ca. 1 mm in diameter (only 5 in holotype), disc dark brown, convex, margin excluded. Exciple brown throughout, concolorous with hypothecium, K−. Epithecium colourless. Hymenium hyaline, 50–70 μm high, I+ blue. Hypothecium brown, concolorous with brown exciple. Asci clavate, 40–50 × 8–12 μm. Spores fusiform, straight, sometimes slightly curved, 8–12 × 2–4 μm.

*C. cervinofusca* is distinguished by dark brown apothecia, exciple merged with hypothecium and spores 8–12 × 2–4 μm.

The taxon is known from the type collection only.
Figures 1–15. 1. VS of apothecium of Catillaria intermixta (Nyl.) Arn., showing relative proportions of different tissues. Black dotted part below hypothecium is crystalline region of the exciple. (Epi., Epithecium, Exc., Exciple, Hym., Hymenium, Hyp., Hypothecium) 2. Exciple of C. intermixta (Nyl.) Arn., the areas marked with arrows have been enlarged to show the prosoplectenchymatous nature and the presence of crystals. 3. VS of apothecium of C. leptocheila (Tuck. in Nyl.) Riddle, showing the different tissues. 4. Exciple of C. leptocheila (Tuck. in Nyl.) Riddle, arrowed part enlarged to show prosoplectenchymatous nature. 5–7. Asci of (5) C. intermixta (Nyl.) Arn., (6) C. leptocheila (Tuck. in Nyl.) Riddle and (7) C. sikkimensis (Müll. Arg.) Zahlbr. showing variation in the ascus apices in the same apothecium. 8. Paraphyses of C. intermixta (Nyl.) Arn., showing pigmented 'hood' like apices. 9–15. Spores of (9) C. erysiboides (Nyl.) Th. Fr., (10) C. leptocheila (Tuck. in Nyl.) Riddle, (11) C. nigriens G Pant and Awasthi, (12) C. obscura G Pant and Awasthi, (13) C. versicolor G Pant and Awasthi, (14) Protoblastenia manipurensis (K Singh) G Pant and Awasthi and (15) Buellia metaleptodes (Nyl.) G Pant and Awasthi.
Figures 16-21. 16. VS apothecium of *Catillaria intermixta* (Nyl.) Arn., black region below hypothecium shows crystalline part of exciple. 17. VS apothecium of *C. leptochella* (Tuck. in Nyl.) Riddle. 18. Exciple of *C. leptochella* (Tuck. in Nyl.) Riddle, a part enlarged. 19. Ascus of *C. intermixta* (Nyl.) Arn. 20. Paraphyses of *C. intermixta* (Nyl.) Arn. 21. Ascus and paraphyses of *C. leptochella* (Tuck. in Nyl.) Riddle.
6.2 *Catillaria endochroma* (Fée) Zahlbr.


Type collection: America meridionali, ad Cinchonas—not seen (figure 33).


Chemistry: Zeorin and atranorin in TLC.

*C. endochroma* is distinguished by the presence of black apothecia with a distinct yellow-brown margin, spores (12—) 16–20 (– 24) × 4–6 μm, and presence of zeorin and atranorin. The taxon is close to *C. leptochiloides* in external appearance of apothecia and the yellow-brown margin but the latter species is differentiated by its K+ violet hypothecium.

Tuckerman (1888, p 55) mentions ‘hypothecium fuscescent, received in a bright yellow layer’. Apparently, bright yellow layer refers to the yellow exciple below hypothecium. *C. endochroma* is distributed in tropical regions.

Specimens examined: India, Tamil Nadu: Palni hills, Pillar rocks area, alt. 2160–2250 m, on bark of tree, 1970, Singh 70.648 (LWU); same locality, alt. ca 2250 m; on bark of tree, 1970, Awasthi and Singh 70.248 A (LWU).

6.3 *Catillaria erysiboides* (Nyl.) Th. Fr.


Type collection: Helsinki—not seen.

Thallus lignicolous, crustose, eroded to evanascent. Apothecia ca. 0-2 mm in diameter, disc yellowish-brown, red-brown to blackish-brown, concave to convex, margin black, raised, entire. Exciple pale yellow to dark brown towards margin, 40–50 μm thick, K–. Epitheciun pale brown. Hymenium hyaline, 40–50 μm high, I + blue. Hypothecium pale yellow, 20–30 μm thick, K–. Asci 36–40 × 8–10 μm. Spores ellipsoid (6–) 8–10 × 4–6 μm. Pycnidia not seen.

Chemistry: No lichen products found in TLC.

The species corresponds to the description given by Nylander (1861) and Coppins (1983). The type or authentic material has not been examined and hence the specimens have been identified on the basis of literature. The apothecia of European specimens are reported to be lighter in colour by Coppins (1983). However, it is a well known fact that exposure to stronger sunlight tends to make the thallus and apothecia darker in several taxa of the lichens and it is likely that the darker colour of disc and margin of Indian specimens is due to a exposure to the stronger sunlight.
C. erysiboides is similar to C. atropurpurea (Schaer.) Th. Fr., but the latter is reported (Th. Fries 1874, p. 565) to have larger (0-4-0.8 mm) apothecia and larger (10-14 × 5-7 μm) spores, while Tuckerman (1888, p. 30) has given spore size of C. atropurpurea as 11-16 × 5-7 μm.


6.4 Catillaria intermixta (Nyl.) Arn.


Type collection: Scania, Hb. Acharius—not seen (figure 34).

Thallus corticolous, crustose, greyish-brown, smooth to somewhat granular. Apothecia (0.2-)0.5-1 (-2) mm in diameter, disc black, plane to convex, epruinose, margin black, entire, later excluded, sometimes wavy in larger apothecia. Exciple colourless to brown, 50-80 (-120) μm thick, K -. Epithecium brownish to greenish tinged. Hymenium hyaline, 50-70 (-100) μm high, I + blue. Hypothecium pale brown to brown, 20-30 (-50) μm thick, K+ violet. Asci (34-) 50-60 (-80) × (10-) 12-18 (-20) μm. Spores fusiform, straight to curved, (12-) 14-18 (-22) × (4-) 6-8 μm. Pyconidia black, dot like. Pyconoconidia colourless, ellipsoid, ca. 4 × 2 μm.

Chemistry: Usually no lichen products, but in two specimens zeorin and atranorin were present in TLC.

C. intermixta is distinguished by black apothecia with black margin, hypothecium brown, K+ violet, and spores (12-) 14-18 (-22) × (4-) 6-8 μm. It resembles C. sikkimensis in the presence of black apothecia but the latter differs in the presence of fumarprotocetraric acid and hypothecium K-. C. intermixta is widely distributed in pantropical to temperate regions.

Specimens examined: Specimens lacking lichen products. India, Madhya Pradesh: Hoshangabad district, Pachmarhi, Patharchatta, alt. ca. 750 m, on bark, 1973, Singh 73-47 (LWU). Tamil Nadu: Nilgiri hills, Pykara forest range, along road side near Pykara, alt. ca. 2100 m, on bark of tree, 1971, Awasthi and Singh 71-236 (LWU); Ootacamund–Mysore road, Sholas at 8–9 miles, alt. 2100 m, on bark of tree, 1959, Awasthi 4482 (Awas.). W. Bengal: Darjeeling district, Darjeeling—Pashok road, at about 7 miles from Darjeeling, alt. ca. 1800 m, on bark of tree, 1967, Awasthi and Agarwal 67-137 (LWU).

Ceylon (Sri Lanka), Ramabode, 1879, E Almquist s.n. (H–NYL 18213).

Specimens possessing zeorin and atranorin: India, Tamil Nadu: Nilgiri hills, Naduvattam Cinchona plantation, alt. ca. 1500 m, on bark of Cinchona trees, 1972, Singh 72-74 (LWU); Palni hills, Perumal to Palni road side, via short cut road, alt. 1350-1500 m, on bark of tree, 1970, Singh 70-978 (LWU).

6.5 Catillaria leptocheila (Tuck. in Nyl.) Riddle

Lichen genus Catillaria s. lat. in India

379

Type collection: Cuba, Wright 227—not seen (figure 35).

Thallus corticolous, crustose, greyish-brown, granular to areolate. Apothecia (0.2–)
0.5–1 mm in diameter, disc black, plane to convex, margin black, entire, included in
mature apothecia. Exciple violet (blackish in thick section), 60–100 μm thick, K +
purple. Epithecium brown to blackish-green. Hymenium hyaline, 50–70 (–90) μm
high, I+ blue. Hypothecium pale brown, 30–40 μm thick, K −. Asci 40–60 × (10 −)
14–20 μm. Spores ellipsoid to fusiform, straight to curved, sometimes obliquely
curved (the two ends curved in opposite direction (figures 10, 28)), rarely the two
cells unequal in size, (12 −) 14–20 (–22) × 4–6 μm. Pycnidia black, dot-like.
Pycnoconidia colourless, ellipsoid, ca. 4 × 2 μm.

Chemistry: Zeorin (+) and atranorin (+) in TLC.

C. leptocheila is distinguished from all other Indian species by the presence of some
of the spores being obliquely curved. This oblique curvature (figures 10, 28) seems
very characteristic of the species. It has been mentioned under Lecidea leptocheila
by Tuckerman (1864, p 280) and also by Vainio (1890, p 42) 'sporae . . . rectae aut
pr. p. oblique curvatae'. C. leptocheila is primarily distributed in tropical America.

Specimens examined: India, Tamil Nadu: Palni hills, Perumal to Palni road side,
via short cut road, alt. 1350–1500 m, on bark of tree, 1970, Singh 70-1008 (LWU);
Kodaikanal, Shembaganur, Tiger Shola, alt. ca. 1650 m, on bark of tree, 1970,
Awasthi and Singh 70.141 (LWU); Nilgiri hills, Avalanche, near forest rest house,
alt. ca. 2100 m, on bark of Euphorbiaceous tree, 1971, Singh 71:369 (LWU).

6.6 Catillaria leptocheiloides (Nyl. in Crombie) Zahlbr.

Cat. lich. univ. 4: 19 (1926).—Lecidea leptocheiloides Nyl. in Crombie, J. Linn. Soc.
Bot. 16: 225 (1877).

Type collection: Taiti, 1875, Moseley s.n. (Holotype: H–NYL 18306!). (figures 36, 37).

Thallus corticolous, crustose, whitish-grey to grey-brown, granular—verrucose to
areolate. Apothecia 0.2–0.5 (–1) mm in diameter, disc black, concave to convex,
margin entire, pale yellow to yellowish-brown in plane apothecia and excluded in
convex apothecia. Exciple colourless to pale yellow, (40 −) 80–100 (–110) μm thick,
K −. Epithecium dark greenish tinged. Hymenium hyaline, (50 −) 60–80 (–120) μm
high, I+ blue. Hypothecium colourless to brown, 20–30 (–50) μm thick, K +
violet-brown. Asci 40–50 (–64) × 10–16 (–20) μm. Spores ellipsoid to fusiform,
straight to slightly curved, (12 −) 14–18 (–22) × 4–6 μm. Pycnidia black, dot-like.
Pycnoconidia colourless, ellipsoid, ca. 4 × 2 μm.

Chemistry: Zeorin and atranorin in TLC.

C. leptocheiloides is distinguished by black apothecia with a yellow to yellow-
brown margin, hypothecium K+ violet, spores (12 −) 14–18 (–22) × 4–6 μm.
C. endochroma has a yellow apothecial margin but its hypothecium is K −.
C. leptocheila is also very close but differs in the black apothecial margin,
hypothecium K −, and obliquely curved ends in some of the spores.
C. leptocheiloides is known from Taiti and India.
Specimens examined: India, Karnataka: Hassan district, near Sakleshpur, Sambhalli, alt. ca. 900 m, on bark of tree, 1979, Awasthi, Upreti and Misra 79-374 (LWU). Kerala: Idukki district, ICRI Campus, Myladumpara, alt. ca. 1200 m, on bark of tree, 1984, D Awasthi and G Awasthi 84-104 (LWU). Tamil Nadu: Palni hills, Kodaikanal near the Pillar rocks, alt. ca. 2250 m, on bark of tree (Acacia), 1970, Awasthi and Singh 70-240 (LWU); Shola near 9th mile, Kodaikanal–Berijam road, alt. 2250 m, on bark of tree, 1959, Foreau and Awasthi 4193 B (Awas.); Nilgiri hills, Kotagiri to Kodanad, near Finger Post, alt. ca. 1890 m, on bark of tree, 1971, Singh 71-946 (LWU); on way from Kilkotagiri to Konada, alt. ca. 1800 m, on bark of tree, in Shola, 1971, Awasthi and Singh 71-89 (LWU); Avalanche, in Shola near forest rest house, alt. ca. 2100 m, on twigs of trees and shrubs, 1971, Awasthi and Singh 71-263 (LWU—no lichen products). Taiti, 1875, Moseley (H–NYL 18306).

6.7 **Catillaria nilgiriensis** G Pant and Awasthi sp. nov.

Thallus saxicolous, crustose, greenish-yellow to grey, thin, somewhat furfuraceous or rudimentary. Algal cells 4-6 (-8) μm in diameter. Apothecia sessile, 0.2-1.5 mm in diameter, disc black, concave to convex, pruinose in young concave condition, margin black, entire, excluded in mature apothecia. Exciple brown, 80-100 μm thick, K-, prosoplectenchymatous with radiating hyphae which are elongate at periphery and hexagonal towards centre. Epithecium brownish, K-. Hymenium hyaline, 70-80 μm high, I+ blue. Hypothecium brown, 30-40 μm thick, K-. Asci clavate, 8-spored, 60-70 × 14-20 μm, tholus I+ blue. Spores 2-celled, colourless, thin walled, fusiform, straight, sometimes curved, 16-22 (-24) × 6-8 μm. Paraphyses simple, capitate, apical cell swollen, ca. 3-2 μm thick, brown pigmented. Pycnidia not seen.

Chemistry: No lichen products in TLC.

The taxon is known from the type collection only and is so far the only saxicolous species of *Catillaria* known from India.

6.8 **Catillaria obscura** G Pant and Awasthi sp. nov.

Thallus corticolous, crustose, greyish-brown to brown-black, granular. Algal cells 6-8 μm in diameter. Apothecia 0.2-0.5 (-1) mm in diameter, disc black, convex,

Chemistry: Atranorin in TLC.

The substratum (bark) is densely covered by a green algal growth, and the lichen thallus is present in between or partly covered by the algal growth.

The taxon is known from the type collection only.

6.9 *Catillaria sikkimensis* (Müll. Arg.) Zahlbr.


Chemistry: Fumarprotocetraric acid, zeorin and atranorin in TLC (figure 40).

Thallus corticolous, crustose, thin to thick, greyish-brown, granular-verrucose to verrucose. Apothecia (0–2) 0.5–1.5 mm in diameter, confluent, disc black, plane to slightly convex, margin brown-black to black, often excluded, over-mature apothecia tend to be irregularly lobed to somewhat glomerulate. Exciple colourless to pale yellow, 80–90 (−120) μm thick, K−. Epithecium greenish. Hymenium hyaline, (50−) 60–70 (−100) μm high, I + blue. Hypothecium colourless to brownish, (20−) 30–40 μm thick, K−. Asci (46–) 50–60 (−70) × 14–20 μm. Spores fusiform, straight to slightly curved, (12–) 18–22 × 4–6 μm. Pycnidia black, dot-like. Pycnoconidia not seen.

Chemistry: Fumarprotocetraric acid, zeorin and atranorin in TLC

*C. sikkimensis* is distinguished by black apothecia which often tend to be lobed or glomerulate when over-mature, hypothecium K−, and presence of fumarprotocetraric acid. The species is close to *C. intermixta* but the latter lacks fumarprotocetraric acid and its hypothecium is K+ violet. *C. sikkimensis* is known from India and Nepal.

Specimens examined: India, W. Bengal; Darjeeling district, Kalimpong division on way to Munsong from Kalimpong, alt. ca. 1650 m, on bark of tree, 1967, Awasthi and Agarwal 67:265 (LWU); Kurseong, near St. Mary College, alt. ca. 1650–1800 m, 1966, Awasthi and Agarwal 66:163 (LWU); India Oriental. (Sikkim) Darjeeling, 1894, leg. Rev. Stevens 15 (G.)

Nepal, Central Nepal, Bagmati zone, Manichur near temple, alt. 2250 m, on bark, 1976, Sharma 76:343 (LWU).

6.10 *Catillaria versicolor* G Pant and Awasthi sp. nov.

Thallus corticolus, crustaceus, sat tenuis, areolatus, pallido-fuscescens. Apothecia densa, 0.2–0.5 mm lata, disco pallido-fuscescens aut fusco-nigricans, leviter

Type collection: India, Tamil Nadu: Nilgiri hills, Ootacamund, Bandy shola, alt. ca. 7000 ft. (=2100 m), on bark of tree, 1971, D D Awasthi and K P Singh 71:303 pr. major p. (Holotype: LWU) (figure 41).

Thallus corticolous, crustose, light brown, thin, areolate, eroded at places. Algal cells 6–8(−10) μm in diameter. Apothecia dense, 0.2–0.5 mm in diameter, disc pale brown to brown-black (slightly pruinose in concave young condition), concave to slightly convex, margin paler than disc, entire, excluded in mature, convex apothecia. Exciple colourless to light brown, 80–90 μm thick, K−, prosoplectenchymatous with radiating hyphae which are elongate at periphery and hexagonal towards centre. Epithecium brownish, K−. Hymenium hyaline, 60–70 μm high, I+ blue. Hypothecium colourless, 20–30 μm thick, K−. Asci clavate, 8-spored, 48–56 × 12–16(−20) μm, tholus I+ blue. Spores 2-celled, colourless, thin walled, fusiform, straight to sometimes slightly curved, 12–16 × 6–8 μm. Paraphyses simple, capitate, apical cell swollen, ca. 3.2 μm thick, brown pigmented. Pycnidia black, dot-like. Pycnoconidia ca. 4 × 2 μm.

Chemistry: No lichen products in TLC.

The taxon is known from type collection only. It is distinguished by the dense, minute apothecia, variably coloured disc, hypothecium K−, spores 12–16 × 6–8 μm, and absence of lichen products.

7.

The following taxa reported from India have been excluded from the present study on account of the reasons given against each.

7.1 *Catillaria bouteillei* (Desm.) Zahlbr.


7.2 *Catillaria indica* B. de Lesd.

The taxon was described in 1910. Bouly de Lesdain collections at Dunkerque are reported to have been destroyed in 1940 during World War II (Laundon 1979). Apparently the type of *C. indica* may also have been destroyed.

7.3 *Catillaria manipurensis* K Singh

The type was examined and the epithecium and exciple are K+ purple (anthraquinone present), and the spores are simple and hyaline (figure 14). Hence it is not a *Catillaria* but a *Protoblastenia*. The new combination is proposed:

Lichen genus *Catillaria* s. lat. in India

Type collection: India, Manipur: Churachandpur—Kolbung, alt. ca. 1050 m, K P Singh 550705 (Holotype: CAL!). This taxon resembles *Protoblastenia russula* (Ach.) Räsanen but differs in the 16-spored asci.

7.4 *Catillaria metaleptodes* (Nyl.) Zahlbr.

The spores are 2-celled and brown (figure 15) in the holotype (S) examined. The same colour is also mentioned in the protologue. It is thus not a *Catillaria* but a *Buellia*. The new combination is proposed:


Type collection: Ceylon, leg. Almquist (Lectotype: S!).

7.5 *Catillaria semecarpi* Vainio


The holotype, Nova Granata, 2000 m, on bark, Lindig 766 (H–NYL 21863), was examined but the apothecia-like spots do not contain asci or spores, etc., although Nylander (1863, p 344) mentioned asci 8-spored and spores 11–13 × 3:5–4:5 μm. Two specimens from India Oriental. ‘Rotas Palace, Son river’ on rock, leg. Dr J D Hooker (H–NYL 19656, 19657) and det. *L. sordidula* Nyl. in Nylander’s handwriting also do not possess any asci and spores. The ‘name’ has a holotype!

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