

A key to species of the lichen genus *Parmelia sensu lato* in the Indian subcontinent

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The paper presents a key for identification of 20 genera and 164 species segregated from the genus *Parmelia sensu lato* from the Indian subcontinent.

Key-words — Lichens, key, *Parmelia*, India.

INTRODUCTION

THE genus *Parmelia* (Ach.) De Not. as circumscribed by Zahlbruckner (1926) was the largest genus of foliose lichens, containing approximately 700 species in the world. Based on detailed morphological characters, SEM structures and chemistry it has now been split into several genera. Based on the concept of Elix (1993a), Awasthi (1998) reported the occurrence of 33 genera and 204 species of Parmeliaceae in the Indian subcontinent. Many taxa of *Parmelia sensu lato*, as contained in his work (Awasthi 1988) do not occur in this region. This communication provides a complete key for identification of different genera and species of the *Parmelia*-complex hitherto known from the Indian subcontinent. The key is based on morphological, anatomical and chemical characters as well as phytogeographical distribution of different taxa.

MATERIAL AND METHOD

The colour test by well known chemical reagents of lichenology (Potassium hydroxide (K), para-Phenylenediamine (P) and Calcium hypochlorite (C)) were made on thallus and medulla. Lichen substances were investigated with thin layer chromatography (TLC) in solvent system A (Toluene: 1-4 Dioxan; Acetic Acid: : 180:60:4).

The study is based on the views of Elix (1993a, b, 1994, 1997), Elix *et al.* (1986), Elix and Hale 1987, Esslinger (1977, 1978, 1992), Hale (1965,

1972, 1973, 1974a, b, c, 1975, 1976a, b, c, d, 1984, 1986, 1987), Hale ad Fletcher (1990), Krog (1982), Kurokawa (1991, 1993, 1994), Kurokawa and Arakawa (1997), Sharma and Kurokawa (1990) and Sipman (1986).

Key to the *Parmelia sensu lato* from the Indian subcontinent

1. Thallus yellow green, gray to gray brown.....2
- 1a. Thallus brown to olive brown5
2. Thallus pseudocyphellate.....3
- 2a. Thallus lacking pseudocyphellae.....6
3. Thallus maculate, pseudocyphellae linear, usually effigurate, lower surface with black rhizinae up to edge of lobes, medulla
K + red (Salazinic acid present) *Parmelia*
- 3a. Thallus lacking maculae, pseudocyphellae punctiform, rhizinae simple not reaching up to edge of lobes, medulla, K-.....4
4. Thallus yellow to yellow-green, Usnic acid present, medulla C + red (Gyrophoric acid present) *Flavopunctelia*
- 4a. Thallus gray to gray-brown, Usnic acid absent, medulla C+red (Gyrophoric /Lecanoric acid present)*Punctelia*
5. Upper cortex HNO₃+blue green*Neofuscelia*
- 5a. Upper cortex HNO₃*Melanelia*

*Corresponding author

6. Thallus ciliate7
- 6a. Thallus lacking marginal cilia19
7. Thallus with bulbate cilia along margin8
- 7a. Thallus with simple cilia along margin9
8. Thallus yellow-green to yellow, Usnic acid present
.....*Relicina*
- 8a. Thallus gray to gray brown, Usnic acid absent
.....*Bulbothrix*
9. Rhizinae dichotomously branched ...*Hypotrachyna*
- 9a. Rhizinae simple or squarrosely branched.....10
10. Rhizinae restricted in the central part of lower
surface, resulting in a broad bare marginal zone
.....11
- 10a. Rhizinae present throughout the lower surface....13
11. Upper surface emaculate or if maculate, maculae
neither effigurate nor forming reticulate
cracks.....*Parmotrema*
- 11a. Upper surface white maculate12
12. Maculae effigurate but not forming reticulate
cracks, dimorphous rhizines and filiform conidia
.....*Canomaculina*
- 12a. Maculae forming reticulate cracks, lower surface
with simple to squarrosely branched rhizinae up to
margin*Rimelia*
13. Thallus lobes narrow, linearly elongate, canaliculate,
dichotomous, rhizinae present or absent
.....*Everniastrum*
- 13a. Thallus lobes flat14
14. Upper surface maculae forming reticulate cracks
.....*Rimelia*
- 14a. Upper surface maculae not forming reticulate
cracks15
15. Cilia robust, markedly tapered, commonly furcate,
upper surface with effigurate maculae, conidia
filiform (12-16 μm)*Canomaculina*
- 15a. Cilia slender not markedly tapered, simple, upper
surface emaculate or with spotted maculae, conidia
cylindrical or bifusiform (3-8 μm)16
16. Medulla yellow at least in part, C-or C+ more
intensely yellow, containing Secalonic acid and
triterpenes.....*Myelochroa*
- 16a. Medulla white or if partially yellow, C+ rose or red
lacking, triterpenes and Secalonic acids17
17. Cilia evenly dispersed, apices of lobes truncate,
emaculate, rhizines furcate to weakly
dichotomously divided, conidia small, cylindrical (3-
4 μm)*Parmelinopsis*
- 17a. Cilia mainly in lobe axils, apices rotund, rhizinae
simple, conidia usually larger (4-8 μm).....18
18. Lobes narrow (1-6 mm), upper surface commonly
maculate, medulla containing Lecanoric acid or fatty
acid..... *Parmelina*
- 18a. Lobes broad (3-10 mm), upper surface emaculate,
medulla containing Salazinic acid (K+
red).....*Parmelinella*
19. Rhizinae simple to squarrosely branched, leaving a
narrow bare marginal zone.....20
- 19a. Rhizinae dichotomously branched up to
margin.....*Hypotrachyna*
20. Rhizinae restricted to the centre having a bare
marginal zone (more than 2 mm wide)
.....*Parmotrema*
- 20a. Rhizinae up to margin but leaving a small erhizinate
or papillate marginal area (less than 2 mm wide)
.....21
21. Thallus gray (atranorin), rarely yellow-gray (Usnic
acid), lobes relatively narrow*Canoparmelia*
- 21a. Thallus yellow to yellow green with Usnic acid
.....22
22. Thallus lobes broad, more than 2 mm wide,
subrotund not incised, relatively large spore (14-20
x 7-10 μm), cell wall containing isolichenan
.....*Flavoparmelia*
- 22a. Thallus lobes narrow, up to 2 mm wide, spore small
(5-12 x 4-8 μm)23
23. Thallus corticolous, lobes linear, truncate, cell wall
containing isolichenan, conidia fusiform
.....*Relicinopsis*
- 23a. Thallus saxicolous or terricolous, lobe apices often
incised adante, cell wall containing
Xanthoparmelia type lichenan, conidia bifusiform
.....*Xanthoparmelia*

24. Thallus yellow-grey, Medulla yellow, Seocalonic acid and traces of atranorin, spores 5-12 x 4-8 μm***Pseudoparmelia***.
- 24a. Thallus gray, Medulla white, atranorin or Usnic acid present, Secalonic acid absent, spores 10-14 x 6-12 μm ***Canoparmelia***.
- Bulbothrix*** Hale, Phytologia 28: 480. 1974.
1. Thallus isidiate.....2
- 1a. Thallus lacking isidia4
2. Medulla K-, C+ rose, KC+ red, Gyrophoric acid present, lobes linear, narrow 0.5-1.5 mm wide, margin often dissected; from Manipur.....
- B. goebelii*** (Zenker) Hale
- 2a. Medulla K+red, Salazinic acid present, lobes wider more than 1.5 mm wide3
3. Lower surface black with papillate brown marginal zone, lobes 1.5-5 mm wide, faintly or well maculate, margin crenate, isidia simple; from E. Himalayas and N.W. Himalayas and Nepal***B. tabacina*** (Mont. & Bosch) Hale
- 3a. Lower surface pale brown to brown throughout, lobes 2-6 (-10) mm wide, emaculate, isidia black tipped eventually coralloid; from Madhya Pradesh, Karnataka, Darjeeling, Kumaon Himalayas and Nepal***B. isidiza*** (Nyl.) Hale
4. Medulla K-, rhizinae dichotomously branched, apothecia coronate, spore 5 x 4 μm ; from Palni Hills***B. bulbochaeta*** (Hale) Hale
- 4a. Medulla K+ red, Salazinic acid present, rhizinae simple, apothecia ecoronate, spore 8-21 x 5-12 μm 5
5. Lower surface pale brown throughout, thallus closely adnate to substratum, lobes 2-6 mm wide, apothecia 2-7 mm diam; from Manipur, Darjeeling, Arunachal Pradesh, Kumaon Himalayas, Jammu and Kashmir, Nepal ***B. setschwanensis*** (Zahlbr.) Hale
- 5a. Lower surface jet black, marginal zone pale brown to brown, with papillate rhizinae, thallus adnate, apothecia 2-10 mm diam6
6. Lobes suirregular, broader, margins crenate with bulbate cilia in axils, upper surface faintly maculate or emaculate, apothecia 4-10 mm diam., spore 12-21 μm long; from Palni Hills, Madhya Pradesh, Darjeeling, Kumaon Himalayas, Himachal Pradesh, Jammu and Kashmir and Nepal ***B. meizospora*** (Nyl.) Hale
- 6a. Lobes sublinear, margin more or less crenate, with sparse cilia, moderately maculate, apothecia 2-6 mm diam., spore 8-10 μm long; from Palni Hills, Kerala, Kumaon Himalayas ***B. sensibilis*** (Stein. and Zahlbr.) Hale
- Canomaculina*** Elix & Hale, Mycotaxon. 29: 239 1987.
1. Thallus isidiate, maculate, cilia long, robust, all along margin, apothecia absent; from Palni and Nilgiri Hills, W. Bengal, Manipur, Arunachal Pradesh, Kumaon and Garhwal Himalayas, Himachal Pradesh***C. subinctoria*** (Zahlbr.) Elix
- 1a. Thallus sorediate, isidia absent, lower surface pale brown or black, lobes up to 10 mm wide,
2. Lower surface pale brown, marginal cilia 0.5-1.5 mm long, apothecia 10-13 mm in diameter, Salazinic and protolichesterinic acid present; from E. Himalayas, Nilgiri and Palni Hills ***C. subsumpta*** (Nyl.) Elix
- 2a. Lower surface black, marginal cilia 1.5-2.5 mm long, apothecia 6 mm in diameter, only Salazinic acid present from Nepal. ***C. leucosemtheta*** (Hue) Elix & Hale
- Canoparmelia*** Elix and Hale in Elix *et al.*, Mycotaxon 27: 277. 1986.
1. Thallus isidiate or pustulate isidiate2
- 1a. Thallus lacking isidia5
2. Thallus greenish yellow (Usnic acid present), emaculate, isidia laminal, cylindrical to coralloid but not pustulate, medulla K-, KC+ reddish (Divaricatic acid present); from Nilgiri and Palni Hills, Darjeeling, Nagaland, Kumaon Himalayas***C. ecaperata*** (Müll. Arg.) Elix & Hale
- 2a. Thallus mineral gray (Usnic acid absent), isidia pustulate3
3. Isidia cylindrical, medulla K- red, Salazinic acid present, lobes 1-3 mm wide, upper surface cracked,

- spores 12 x 6 μm ; from Nilgiri Hills
.....*C. cinerascens*
(Lyngé) Elix & Hale
- 3a. Isidia pustulate, medulla K-4
4. Thallus corticolous, medulla KC+ red or KC-
(Atranorin and Divaricatic acid present) lobes 2-5
mm wide, isidia laminal dense, bursting apically but
not forming soredia, apothecia absent; from E.
Himalayas*C. eruptens* (Kurok.)
Elix & Hale
- 4a. Thallus saxicolous, medulla KC- (Atranorin,
Sekikaic and fatty acid present), lobes 0.5-2 mm
wide, isidia laminal or eventually inflated and
bursting open apically forming soredia, apothecia
present, from Tamil Nadu *C.*
pustulescens (Kurok.) Elix
5. Thallus sorediate or pustulate sorediate, maculate,
epruinose6
- 5a. Thallus lacking soredia and pustules, faintly
pruinose, medulla C+ rose red (Lecanoric acid
present), apothecia present, from E. Himalayas
..... *C. pruinata* (Müll.
Arg.) Elix & Johnston
6. Medulla yellow, P+ orange-red, Stictic acid present,
lobe surface wrinkled and cracked, apothecia
absent; from Nilgiri Hills, Kerala
.....*C. carneopruinata* (Zahlbr.)
Elix & Hale
- 6a. Medulla white, lobe surface otherwise
.....7
7. Medulla P+ orange-red, Stictic acid present, lobes
emaculate, upper surface minutely reticulate
wrinkled, soralia laminal to submarginal, capitate to
diffuse, apothecia rare; from Nilgiri and Palni Hills,
Kerala, E. Himalayas
C. crozalsiana (B.de. Lesd.) Elix & Hale
- 7a. Medulla P-, C-, KC- rose red8
8. Medulla KC+ rose-red, Divaricatic acid present,
lobes adnate, upper surface reticulately cracked,
soralia initially pustulate, later capitate, verrucose,
apothecia rare, spore 8-12 μm long; from Nilgiri and
Palni Hills, Karnataka, Kerala, Madhya Pradesh,
Kumaon Himalayas*C. texana*
(Tuck.) Elix & Hale
- 8a. Medulla white or yellow, below soralia KC+ rose
red, Perlatolic acid present, soralia capitate,
apothecia common, spores 18-14 μm long; from
Madhya Pradesh, Kumaon and Garhwal
Himalayas, Himachal Pradesh.....
C. aptata (Krempelh.) Elix & Hale
- Everniastrum* Hale ex Sipman, Mycotaxon 26:
237. 1986.
1. Thallus K+ red, Salazinic acid only2
- 1a. Thallus K-red, Salazinic acid and in additional either
Protolichesternic or Norstictic acid3
2. Thallus isidiate, lower surface rhizinate, from W.
Bengal, Manipur, Nilgiri and Palni Hills
.....*E. vexans* (Zahlbr.) Hale
- 2a. Thallus lacking isidia, lower surface erhizinate or
rhizinae only near margins, from Nilgiri and Palni.
Hills, Kerala, Darjeeling, Sikkim, Shillong, Himachal
Pradesh, Jammu and Kashmir, Kumaon and
Garhwal Himalayas and Nepal.....
E. cirrhatum (E. Fries) Hale
3. Additional Lichen acid, Portolichesterinic acid,
lower surface with uniform rhizinae, from
Darjeeling, Manipur, S. India and Nepal.....
E. nepalense (Taylor) Hale
- 3a. Additional Lichen acid Norstictic acid, lower
surface erhizinate or with sparse rhizinae only near
margins; from Nagaland
E. neocirrhatum (Hale & Wirth) Hale
- Flavoparmelia* Hale, Mycotaxon 25: 604. 1986.
1. Thallus yellow-green, upper surface rugulose, lobes
apically rotund, faintly maculate, sorediate, medulla
white, P+ orange-red, Protocetraric and Usnic acid
present, apothecia rare; from Nilgiri and Palni Hills,
Sikkim, Assam, Manipur, Jammu and Kashmir,
Kumaon and Garhwal Himalayas.....
F. caperata (L.) Hale
- Flavopunctelia* (Krog) Hale, Mycotaxon 20: 682.
1984.
1. Thallus sorediate, soredia laminal and marginal,
pseudocyphellae present, punctiform; from Nilgiri
Hills, Himachal Pradesh, Jammu and Kashmir,
Kumaon and Garhwal Himalayas
.....*F. flaventior* (Stirton) Hale
- 1a. Soralia marginal, crescent shaped, pseudocyphellae

- absent; from Jammu and Kashmir, Himachal Pradesh *F. soledica* (Nyl.) Hale
- Hypotrachyna* (Vainio) Hale, Phytologia 28: 340. 1974.
1. Thallus isidiate.....2
 - 1a. Thallus lacking isidia13
 2. Thallus yellow-green (Usnic acid present), lobes linear, up to 4 mm wide, apothecia 2-6 mm diam., medulla K+ red (Norstictic, Salazinic and Galbinic acid present); from Palni Hills *H. microblasta* (Vainio) Hale
 - 2a. Thallus gray, ashy-gray, usnic acid absent3
 3. Isidia inflated, pustulate, breaking at top into powdery mass, but soredia not formed, lobes 4 mm wide, medulla K-, C-, KC+, rose, physodic acid present; from Shillong *H. dactylifera* (Vainio) Hale
 - 3a. Isidia cylindrical, labulate or lacinulate, never pustulate4
 4. Medulla K+ yellow or red5
 - 4a. Medulla K-.....7
 5. Medulla K+ yellow (Stictic acid present), lobes up to 5 mm wide, margins crenate, apothecia rare; from Kumaon Himalayas and Penisular India *H. crenata* (Kurok.) Hale
 - 5a. Medulla K+ red6
 6. Salazinic and Norstictic acid present, lobes subrotund, 5-10 mm wide, cilia in axil, isidia black tipped, apothecia 2-3 mm diam.; from Nilgiri and Palni Hills, Kerala, Maharashtra..... *H. awasthii* Hale & Patw.
 - 6a. Only Norstictic acid present, lobes sublinear, 2-6 mm wide, isidia club shaped to lobulate, apothecia 5 mm in diam.; from Himalayan region and Nepal..... *H. rhabdiformis* (Kurok) Hale
 7. Medulla P+ orange-red (Protocetraric acid present), lobes 4-10 mm wide, subrotund, apothecia 3 mm in diam.; from Darjeeling, Manipur, Arunachal Pradesh, Nilgiri Hills, Kumaon Himalayas. *H. koyaensis* (Asah.) Hale
 - 7a. Medulla P-.....8
 8. Medulla C+red, Gyrophoric acid present9
 - 8a. Medulla C-.....10
 9. Gyrophoric and Protolichesterinic acid present, lobes 3-5 mm wide, crenate; from Darjeeling *H. incognita* (Kurok.) Hale
 - 9a. Only Gyrophoric acid present, lobes 1-3 mm wide, apothecia 2-3 mm diam., from Darjeeling, Manipur, Nilgiri and Palni Hills *H. neodissecta* (Hale) Hale
 10. Medulla KC+ orange or rose, Barbatic acid present11
 - 10a. Medulla KC, Protolichesterinic and Caperatic acid12
 11. Barbatic, Obtusatic and Norobtusatic acids present, lobes crowded, 2-5 mm wide, white maculate; from Nilgiri and Palni Hills, Darjeeling, Manipur, Arunachal Pradesh, Kumaon Himalayas *H. imbricatula* (Zahlbr.) Hale
 - 11a. Only Barbatic acid present, lobes not crowded, 1-3 mm wide, emaculate; from Nilgiri and Palni Hills, Kumaon Himalayas *H. orientalis* (Hale) Hale
 12. Upper surface maculate, rhizinae forming a thick mat, apothecia rare, spore 8-10 x 4-6 μm ; from Tamilnadu, Kerala *H. costaricensis* (Nyl.) Hale
 - 12a. Upper surface emaculate, lobes imbricate, black rimmed, rhizinae sparse to absent in marginal zone, apothecia common, spore 15-19 x 9-11 μm ; from Darjeeling, Manipur, Arunachal Pradesh, Madhya Pradesh, Palni Hills, Karnataka *H. infirma* (Kurok.) Hale
 13. Thallus pustulate, pustulate-sorediate or sorediate.....14
 - 13a. Thallus lacking pustules and soredia24
 14. Medulla yellow, yellow-ochraceous either throughout or in parts.....15
 - 14a. Medulla white17
 15. Medulla uniformly yellow, upper surface white maculate, lobes 2-3 mm wide, pustules becoming granular sorediate, apothecia large up to 14 mm in

- diam., medulla KC+ reddish (Barbatic and Obtusatic acids present); from Palni Hills*H. endochlora* (Leighton) Hale
- 15a. Medulla partially yellow only below soralia, upper surface emaculate16
16. Thallus UV+yellow (lichenoxanthone present) pustulate-sorediate; from Nilgiri and Palni Hills, Kerala, Darjeeling, Manipur, Meghalaya, Arunachal Pradesh*H. osseoalba* (Vainio) Park & Hale (syn. *H. formosana*)
- 16a. Thallus UV-(lichenoxanthone absent) pustules absent, soralia laminal; from Kerala, Nilgiri and Palni Hills, Karnataka, Darjeeling, Kumaon Himalayas*H. immaculata* (Kurok.) Hale
17. Medulla K+red, Salazinic acid present18
- 17a. Medulla K- or K+ yellow19
18. Lobes 2-5 mm wide, soralia capitate towards lobe tips, sometime on lamina, diffuse, lower surface with dense rhizines; from Manipur, Nagaland*H. brevirhiza* (Kurok.) Hale
- 18a. Lobes 5-10 mm wide, pustulate sorediate, lower surface with moderate rhizines; from Nilgiri and Palni Hills, Kerala*H. dodapetta* Hale & Patw.
19. Medulla P+ orange-red20
- 19a. Medulla P-21
20. Medulla K-, Protocetraric acid present, soralia submarginal, capitate to globular, lobes minutely sinuate, margin dentate to crenate, apothecia absent; from Kumaon Himalayas*H. pseudosinuosa* (Asah.) Hale
- 20a. Medulla K+ yellow, Stictic and Constictic acid present, pustules breaking at top, but not producing soredia, apothecia up to 3 mm in diam.; from Kerala*H. thryptica* (Hale) Hale
21. Medulla C+ red, soralia distinct, generally terminal or subterminal, soredia powdery22
- 21a. Medulla C-, soralia laminar towards the center of thallus, pustulate with sparse, coarse soredia23
22. Thallus 2-8 cm across, emaculate, sorediate, lobes revolute, rather fragile, apothecia rare, Gyrophoric acid present; from Nilgiri and Palni Hills*H. revoluta* (Florke) Hale
- 22a. Thallus 5-12 cm across, white maculate, apothecia 2-8 mm in diam., Lecanoric and Evernic acid present. from Palni Hills.....*H. rockii* (Zahlbr.) Hale
23. Thallus UV+ yellow (lichexanthone present), medulla KC+ red (Lividic acid group present), lobes 1-3 mm wide, medulla yellow below soralia, K+ purple; from Nilgiri and Palni Hills, Kerala, Darjeeling, Manipur, Meghalaya, Arunachal Pradesh.*H. osseoalba* (Vainio) Park & Hale (syn. *H. formosana*)
- 23a. Thallus UV-, medulla KC+ red (Barbatic acid present), lobes 2-5 mm wide; from Nilgiri and Palni Hills, Darjeeling, Arunachal Pradesh, Kumaon Himalayas*H. exsecta* (Tayl.) Hale
24. Medulla K+ red25
- 24a. Medulla K-27
25. Only Salazinic acid present, lobes involute, up to 3mm wide, apothecia, 3-8 mm diam.; from Karnataka, Darjeeling.....*H. coorgiana* Patw. & Prabhu
- 25a. Salazinic and Norstictic acid present26
26. Lobes subrotund, up to 5 mm wide, rugose, rhizinae densely branched, apothecia 2-7 mm in diam.; from Nilgiri Hills, Himachal Pradesh, Kumaon Himalayas*H. sublaevigata* (Nyl.) Hale
- 26a. Lobes linear, up to 2 mm wide, rhizinae moderately branched, apothecia rare, from Karnataka and Maharashtra.....*H. masonhalei* Patw. & Prabhu
27. Medulla yellow-ochraceous, lobes 3-10 mm wide, thallus coriaceous, secondary lobules 1-2 mm wide, rhizinae projecting beyond lobes, apothecia up to 16 mm in diam.; from Darjeeling, Sikkim..... *H. rigidula* (Kurok.) Hale
- 27a. Medulla white28
28. Medulla P+ orange29
- 28a. Medulla P-30
29. Medulla KC+ orange (Barbatic acid present), Protocetraric acid absent, thallus upto 20 cm across,

- coriaceous, lobes 2-5 mm wide, black rimmed, apothecia rare; from Darjeeling *H. scytodes* (Kurok.) Hale
- 29a. Medulla KC-, (Barbatic acid absent) Protocetraric acid present, thallus 2-4 cm across, lobes 2-3 mm wide, margin not black rimmed, apothecia 1.5-3.0 mm in diam., spore 18-28 x 11-13 μm ; from Darjeeling, Manipur, Arunachal Pradesh *H. adducta* (Nyl.) Hale
30. Upper surface white maculate or faintly maculate 31
- 30a. Upper surface emaculate 32
31. Medulla KC+ orange (Barbatic acid present), white maculate, lobes 2-8 mm wide, apothecia up to 10 mm in diam.; from Darjeeling *H. physcioides* (Nyl.) Hale
- 31a. Medulla KC+ rose-red, Aleatoronic acid present, faintly maculate, lobes 1-4 mm wide, apothecia up to 3 mm in diam.; from Nilgiri Hills *H. degelii* (Hale) Hale
32. Medulla C+ rose-red, Gyrophoric acid present 33
- 32a. Medulla C- 34
33. Apothecia 4-13 mm in diam., often split into lobules, lobe margins black rimmed, spore 6-9 x 3-5 μm ; from Darjeeling, Nilgiri Hills, Kumaon Himalayas and Nepal *H. scytophylla* (Kurok.) Hale
- 33a. Apothecia 2-10 mm in diam., lobe margins not black rimmed, spore 12-25 x 6-11 μm ; from Kumaon Himalayas *H. pluriformis* (Nyl.) Hale
34. Medulla KC-, Protolichensterinic acid present, lobes 2-5 mm wide, apothecia 1-3 mm diam., spore 15-21 x 8-11 μm , from Darjeeling, Manipur, Arunachal Pradesh, Tamil Nadu, Kumaon Himalayas *H. flexilis* (Kruok.) Hale
- 34a. Medulla KC+ orange (barbatic acid present), emaculate 35
35. Lobes 6-10 mm wide, apothecia up to 5 mm in diam., amphithecium smooth, spores 12-17 x 6-9 μm ; from Nilgiri Hills, Darjeeling, Sikkim, Arunachal Pradesh, Kumaon Himalayas *H. massartii* (Hue) Hale
- 35a. Lobes 2-5 mm wide, apothecia 2-12 mm in dia., margin often lobulate, amphithecium rugose, spore 8-13 x 4-7 μm , from Darjeeling, Arunachal Pradesh, Kumaon Himalayas *H. bostrychodes* (Zahlbr.) Hale
- Melanelia* Essl. Mycotaxon 7: 46. 1978.
1. Thallus isidiate only 2
- 1a. Thallus lacking isidia, or if present, accompanied with soredia 5
2. Medulla C+ rose-red, KC+ red, Lecanoric acid present 3
- 2a. Medulla C-, KC- 4
3. Thallus and isidia with hyaline cortical hairs, isidia cylindrical, lobes 2-5 mm wide, mostly corticolous; from Himachal Pradesh, Jammu and Kashmir, Kumaon Himalayas *M. vilosella* (Essl.) Essl.
- 3a. Thallus lacking hyaline cortical hairs, isidia globular to knob-shaped with white spot at apex, lobes 1-2 mm wide; from Jammu and Kashmir, Kumaon Himalayas *M. glbratula* (Lamy) Essl.
4. Isidia clavate to spatulate, usually hollow, laminal, rarely marginal, lobes 2-5 mm wide, from Kumaon Himalayas *M. exasperatula* (Nyl.) Essl.
- 4a. Isidia cylindrical, simple to branched, lobes 1-4 mm wide, in rosettes, convex apothecia rare; from Kashmir and Gilgit *M. infumata* (Nyl.) Essl.
5. Thallus sorediate or isidiate and sorediate 6
- 5a. Thallus lacking soredia and isidia 11
6. Thallus isidiate and sorediate, medulla C+ rose-red (Lecanoric acid present), lobes 1-6 mm wide, olive brown to black, from Jammu and Kashmir... *M. subaurifera* (Nyl.) Essl.
- 6a. Thallus sorediate 7
7. Thallus with minute lobules along margin, lobes 0.5 to 2 mm wide, soredia capitate, mostly saxicolous, medulla K-, C-, KC-, P-, from Jammu and Kashmir, Kumaon Himalayas 7

- M. panniformis* (Nyl.) Essl.
- 7a. Thallus lacking minute lobules along margin8
8. Medulla C+ rose-red, KC + red 9
- 8a. Medulla C-, KC-10
9. Gyrophoric acid present, upper surface pseudocyphellate, soralia laminal, capitate, lobes 1-2 mm wide, hyaline cortical hairs absent, convex, saxicolous; from W. Himalayas and Kumaon Himalayas*M. tominii* (Oxner) Essl. [syn. *M. substygia* (Ras.) Essl.]
- 9a. Lecanoric acid present, pseudocyphellae absent, soralia laminal to marginal, lobes 2-6 mm wide, hyaline cortical hairs often present on lobe end, corticolous; from Jammu and Kashmir, Kumaon Himalayas
M. subargentifera (Nyl.) Essl.
10. Pseudocyphellae minute, distinct on upper surface, lobes up to 1.5 mm wide; from Kashmir*M. disjuncta* (Erich.) Essl.
- 10a. Pseudocyphellae absent, lobes 1 mm wide, plane to convex pitted, apothecia rare, mostly saxicolous; from Jammu and Kashmir, Kumaon Himalayas.....*M. sorediosa* (Almb.) Essl.
11. Medulla C+ red, KC+ red (Lecanoric acid present), lobes 2-5 mm wide, rugose with hyaline cortical hairs, apothecia up to 5 mm in diam.; corticolous, from Jammu and Kashmir
M. glabra (Schaerer) Essl.
- 11a. Medulla C-, KC-, lobes 0.5-2 mm wide, hyaline cortical hairs absent12
12. Medulla P+ orange or P-, pseudocyphellate, pseudocyphellae linear; from Tamil Nadu, Darjeeling, Kumaon Himalayas*M. stygia* (L.) Essl.
- 12a. Medulla P-, margin of lobes with minute lobules, pseudocyphellae absent; from Jammu and Kashmir and Kumaon Himalayas
M. panniformis (Nyl.) Essl.
- Myelochroa* (Asah.) Elix & Hale, Mycotaxon 29: 240. 1987.
1. Thallus isidiate or sorediate2
- 1a. Thallus lacking isidia and soredia5
2. Thallus isidiate, isidia cylindrical, globular simple or branched3
- 2a. Thallus sorediate4
3. Medulla yellow, lobes 1-3.5 mm wide, cilia mainly confined to axils, apothecia 1-4 mm in diam., corticolous; from Palni Hills, Karnataka, Sikkim, Manipur.*M. perisidians* (Nyl.) Elix & Hale
- 3a. Medulla white, lobes 0.8-1.2 mm wide, eciliate, apothecia absent; saxicolous, from Nilgiri, Palni Hills, Kumaon Himalayas*M. indica* (Hale) Elix & Hale
4. Medulla entirely or partially yellow (at least pigmented yellow below soralia) lobes up to 4 mm wide, emaculate, apothecia rare pigmented medulla K-; from Nilgiri and Palni Hills, Kerala, Madhya Pradesh, Himachal Pradesh, Darjeeling, Sikkim, Arunachal Pradesh, Kumaon and Garhwal Himalayas*M. aurulenta* (Tuck.) Elix & Hale
- 4a. Medulla deep orange or reddish in lower part, lobes 1-3 mm wide, surface shiny, weakly maculate, apothecia common, pigmented medulla K+ purple; from Palni Hills, E. Himalayas*M. denegans* (Nyl.) Elix & Hale
5. Thallus with dimorphic lobes, primary lobes 2-4 mm broad, secondary lobes 0.5-1.5 mm, wide, imbricate and overlapping, apothecia common, 1-3 mm in diam.; from Palni Hills, Kerala, Darjeeling, Sikkim, Manipur, Kumaon Himalayas.
M. xantholepis (Mont. & v.d. Bosch.) Elix & Hale.
- 5a. Thallus with uniform sized lobes6
6. Upper surface rugose, upper cortex fragile, flaking away over extensive areas, apothecia 3-10 mm diameter, spore 12-15 x 9-11 µm; from, Himachal Pradesh, Kumaon Himalayas and Nepal.
M. entotheiochroa (Hue) Elix & Hale [syn. *M. rhytidodes* (Hale) Elix & Hale]
- 6a. Upper surface smooth, upper cortex entire and continuous, apothecia 1-3 mm diam, spore 5-12 x 4-9 µm, from Darjeeling, Sikkim, Manipur, Nilgiri Hills; Kerala, Kumaon Himalayas
M. irrugans (Nyl.) Elix & Hale [syn. *M.*

subaurulenta (Nyl.) Elix & Hale]

Neofuscelia Essl., Mycotaxon 7: 49. 1978.

1. Thallus isidiate, isidia pustulate, sometimes resembling soralia, wrinkled or pitted rugose, medulla C-, KC+red (Divaricatic acid present); from Kashmir and Gilgit *N. verruculifera* (Nyl.) Essl.

- 1a. Thallus lacking isidia and soredia, medulla C+ red (Lecanoric acid present), apothecia up to 11mm in diam., from N.W. Himalayas *N. pulla* (Ach.) Essl.

Parmelia Ach., Method Lich. 153. 1803

1. Thallus isidiate2

- 1a. Thallus lacking isidia3

2. Maculae effigurate, tuning into pseudocyphellae, pseudocyphellae more than 0.5 mm long, isidia mostly on margin of pseudocyphellae, lobes linear, rhizinae simple, projecting beyond the margins, saxicolous; from Jammu and Kashmir, Kumoan Himalayas *P. saxatilis* (L.) Ach.

- 2a. Maculae densely dispersed, not effigurate, pseudocyphellae minute, less than 0.5 mm long, isidia laminal, lobes subrotund, rhizinae squarrosely branched, commonly corticolous, rarely saxicolous; from W. Himalayas, Himachal Pradesh..... *P. meiophora* Nyl.

3. Thallus sorediate4

- 3a. Thallus lacking soredia5

4. Soralia not pustular, marginal or along ridges of surface, maculae turning into pseudocyphellae, effigurate, which develop granular soredia, apothecia rare; from Nilgiri Hills, Himachal Pradesh, Jammu and Kashmir *P. sulcata* Tayl.

- 4a. Soralia pustular, mostly laminal, upper surface emaculate, reticulately cracked and pseudocyphellate, apothecia absent; from Tamil Nadu *P. erumpens* Kurok.

5. Pseudocyphellae both marginal and laminal6

- 5a. Pseudocyphellae either marginal or laminal7

6. Thallus mineral gray with brownish tip, medulla K+ red, P+yellow (Salazinic acid present) marginal pseudocyphellae discontinuous, laminal pseudocyphellae linear, up to 1 mm long, continuous forming subreticulate network, apothecia rare, 3-12 mm diam.; from Nepal *P. omphaledes* (L.) Ach.

- 6a. Thallus tan to dark brown, upper cortex HNO₃+ pale blue green, medulla K-, P+ red-orange (Fumarprotocetraric acid present), pseudocyphellae mainly on lobe margins but few effigurate on lamina, apothecia infrequent, spore 13-18 x 6-9 µm; from E. Nepal *P. masonii* Essl. & Poelt

7. Pseudocyphellae marginal, lobes 2-5 mm wide, lower surface black, rhizinae simple to squarrosely branched, apothecia up to 2 mm in diam; from Manipur and Arunachal Pradesh *P. ricasolioides* Nyl.

- 7a. Pseudocyphellae laminal8

8. Rhizinae squarrosely branched, upper surface white maculate, maculae turning into pseudocyphellae, lobes up to 6 mm wide, centrally with 1.5 mm wide lobules, apothecia 2-8 mm wide, spore 8-12 x 5-7 µm; from E. Nepal..... *P. submutata* Hue

- 8a. Rhizinae simple to furcate not squarrosely branched9

9. Spores 11-14 x 7-10 µm, pseudocyphellae minute and crowded, separate, less than 0.5 mm long; from Kumaon Himalayas *P. marmariza* Nyl.

- 9a. Spores 18-25 x 11-14 µm, pseudocyphellae forming subreticulate network, more than 0.5 mm long; from Darjeeling, Sikkim..... *P. adaugescens* Nyl. (syn. *P. pseudomarmariza* Awasthi)

Parmelina Hale, Phytologia, 28: 481. 1974.

1. Thallus isidiate, Isidia peltate, medulla C+ red (Lecanoric acid present), lobes 2-6 mm wide; from Jammu and Kashmir *P. pastillifera* (Harm.) Hale

- 1a. Isidia cylindrical, globular, simple or coralloid not peltate.....2

2. Medulla K+ red (Salazinic acid present), lobes sublinear, loosely divaricate, 2-5 mm wide, apothecia 2-4 mm diam., spore 12 x 6µm; from Manipur *P. usambarensis* (Steiner & Zahlbr.) Hale
- 2a. Medulla K- 3
3. Medulla white to pale yellow, P+ red (Stictic acid present), C-, lobes convolute, emaculate, 1-6 mm wide, apothecia absent; from Dehradun *P. mussooriensis* (Awasthi)
- 3a. Medulla white, P-, C+ red, Lecanoric acid present, lobes 2-8 mm wide, undulate, maculate, apothecia present, 2-4 mm diam. from Jammu and Kashmir, Himachal Pradesh *P. tiliaceae* (Hoffm.) Hale
- Parmelinella* Elix & Hale, Mycotaxon 29: 241. 1987
1. Thallus isidiate, isidia cylindrical, globular, simple or branched, lobes subirregular, 3-12 mm wide, apices rotund to subrotund, lower surface papillate in wide marginal zone, apothecia rare, 2-10 mm in diam, from Nilgiri and Palni Hills, Kerala, Karnataka, Darjeeling, Assam, Manipur, Shillong, Madhya Pradesh, Kumaon and Garhwal Himalayas *P. wallichiana* (Taylor) Elix & Hale
- 1a. Thallus lacking isidia 2
2. Lower surface uniformly black, rhizinae dense up to margin, simple to furcate, Salazinic acid and zeroin present, lobes 1-4 mm wide, cilia dense in lobe axil, apothecia 1-5 mm in diam., from Nagaland *P. chozoubae* (K. Singh & Sinha) Elix & Pooprang.
- 2a. Lower surface dark brown to black, with pale brown papillate marginal zone, only Salazinic acid present 3
3. Lower surface brown, rhizinae simple, sparse, lobes 3-5 mm wide, sublinear, convolute, apothecia 3-6 mm in diam., pycnidia not common. from Maharashtra *P. simplicior* (Hale) Elix & Hale
- 3a. Lower surface black with brown papillate marginal zone, lobes 6-12 mm wide, subrotund, apothecia 3-18 mm in diam., pycnidia common, conidia 3-7 µm long. from Manipur, Nagaland *P. manipurensis* (K. Singh) Elix & Hale
- Parmelinopsis* Elix & Hale, Mycotaxon 29: 242. 1987.
1. Thallus isidiate 2
- 1a. Thallus lacking isidia 7
2. Isidia lobulate, peltate, 3
- 2a. Isidia cylindrical, globular, simple or branched 5
3. Medulla C+rose-red, (Gyrophoric acid present), lobes 1-3 mm wide, isidia becoming lobulate; from Kerala, Arunachal Pradesh *P. spathulata* (Kurok.) Elix & Hale
- 3a. Medulla C- 4
4. Medulla KC+ rose-red (trace of Gyrophoric acid present), lobes sublinear, 1-2 mm wide, isidia initially cylindrical, often branched, later on lobulate, ciliate and procumbent; from Tamil Nadu and Nagaland *P. horrescens* (Taylor) Elix & Hale (syn. *Parmelina dissecta*)
- 4a. Medulla KC-, lobes linear, 0.25-1 mm wide, isidia eventually lobulate, apothecia rare, mostly corticolous; from Darjeeling *P. microlobulata* (Awas.) Elix & Hale
5. Medulla C+ rose-red (Gyrophoric acid present), lobes 1-3 mm wide, cilia sparse, apothecia rare, from Nilgiri and Palni Hills, Darjeeling, Meghalaya, Shillong, Jammu and Kashmir *P. minarum* (Vainio) Elix & Hale
- 5a. Medulla C- 6
6. Medulla KC+ red, isidia initially cylindrical later procumbent, lobulate, lobes up to 2 mm wide, lower surface black; from Tamil Nadu *P. horrescens* (Taylor) Elix & Hale (syn. *Parmelina dissecta*)
- 6a. Medulla KC-, isidia cylindrical, simple to coralloid branched, lobes 2-4 mm wide, lower surface pale brown to brown; from Darjeeling, Kerala, Nilgiri Hills, Kumaon Himalayas *P. expallida* (Kurok.) Elix & Hale
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- 7a. Thallus lacking soredia and pustules, medulla C- or

- C+ red, Gyrophoric acid present or absent9
8. Medulla yellow, marginal cilia evenly dispersed, lobes 0.5-1.5 mm wide, pustules isidia like, laminal, brusting apically but not forming soredia; from E. Himalayas, Tami Nadu, Kumaon Himalayas*P. spumosa* (Asah.) Elix & Hale
- 8a. Medulla white, marginal cilia sparse, in lobe axils, lobes 1-2 mm wide, pustules absent, soredia towards lobe tip, capitate; from Tami Nadu*P. cryptochlora* (Vainio) Elix & Hale
9. Medulla C+red, Gyrophoric acid present, lobes 1-4 mm wide, apothecia up to 4 mm in diam., saxicolous, pycnidia absent, from Kumaon Himalayas*P. pindarensis* (Awasthi & S. Singh) Elix & Hale
- 9a. Medulla C-, Gyrophoric acid absent, lobes usually involute, 1-3 mm wide, lobules dense in the central part, apothecia 1-2.5 mm in diam., pycnidia common; from Nagaland*P. nagalandica* K. Singh & Sinha
Parmotrema Mass., Atti Imp. Reg Ist. Venet. Sci, III 5: 248. 1860
1. Thallus isidiate2
- 1a. Thallus lacking isidia10
2. Lobes margin ciliate3
- 2a. Lobes margin eciliate8
3. Medulla K+ red, upper cortex UV + bright yellow (Salazinic and lichenoxanthone present), lobes 8-15 mm wide, marginal cilia 2 mm long, isidia cylindrical, simple or coralloid, apothecia rare, spore 15-17 x 10-12 μ m; from Nepal and Sri Lanka*P. ultralucens* (Krog.) Hale
- 3a. Medulla K-, upper cortex UV-, lichenoxanthone absent4
4. Isidia cylindrical, or becoming sorediate5
- 4a. Isidia lobulate, dorsiventral, palmate, often ciliate, lobes 6-8 mm wide, Gyrophoric acid present; from Karnataka and Nilgiri Hills*P. planatilobatum* (Hale) Hale
5. Isidia ciliate6
- 5a. Isidia eciliate or very rarely ciliate, medulla C+ rose red, Gyrophoric acid present, lobes 5-13 mm wide, margins crenate; from Nagaland.....*P. pseudocrinitum* (des Abb.) Hale
6. Isidia coralloid branched and sorediate, medulla K-C-, Alectoronic acid present; from Darjeeling, Nilgiri and Palni Hills, Kerala, Nagaland.....*P. mellissii* (Dodge) Hale
- 6a. Isidia cylindrical or becoming coralloid, not sorediate, medulla K+ yellow or C+ red7
7. Medulla K+ yellow, P+ orange red (Stictic acid present), upper surface grey (Atranorin) from Nilgiri and Palni Hills, Kumaon Himalayas*P. crinitum* (Ach.). Choisy
- 7a. Medulla K-, P-, C+ red, (Gyrophoric and Protolichesterinic acid present) upper surface yellow to yellow green (Usnic acid) from Nilgiri Hills.....*P. xanthinum* (Müll Arg.) Hale
8. Isidia thick, inflated, lobes 8-12 mm wide, emaculate, apothecia 2-4 mm wide spore 8-12 x 5-8 μ m, medulla C+ red (Lecanoric acid present); from Kerala and Kumaon Himalayas*P. pseudotinctorum* (des. Abb.) Hale
- 8a. Isidia not inflated, cylindrical, filiform, unbranched or coralloid9
9. Medulla C+red (Lecanoric acid present), P-, lobes large, 8-19 (-30) mm wide, emaculate, apothecia rare, up to 10-15 mm in diam., spore 10-16 x 6-9 μ m; from Nilgiri, Palni Hills, Kerala, Karnataka, Madhya Pradesh, W. Bengal, Manipur, Arunachal Pradesh, Jammu and Kashmir, Kumaon, Garhwal Himalayas and Nepal*P. tinctorum* (Nyl.) Hale
- 9a. Medulla C-, P+, red (Protocetraric acid present), isidia filiform, lobes 3-8 mm wide, tubular in peripheral region, sterile; from W. Bengal, Kerala, Goa, South Andaman Island*P. saccatilobum* (Taylor) Hale
10. Thallus pustulate, pustulate sorediate or sorediate11
- 10a. Thallus lacking pustules and soredia

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11. Thallus submarginally pustulate, lobes over 5 mm wide, ciliate, revolute, divide into lobules with pustules, sterile, Alectoronic and α -Collatolic acid present; from Tamil Nadu, Maharashtra and Orissa*P. kamatii* Patw. & Prabhu
- 11a. Pustule absent, thallus sorediate, soralia marginal or laminal12
12. Lobes margin ciliate13
- 12a. Lobes margin eciliate27
13. Medulla K+ red (Salazinic acid present)14
- 13a. Medulla K-.....15
14. Upper surface emaculate, lobes 6-19 mm wide, crenate-dentate, sorediate, lobes involute, sterile; from Nilgiri and Palni Hills, Kerala, Nagaland*P. stuppeum* (Taylor) Hale
- 14a. Upper surface white maculate lobes dimorphic, main lobes rotund, up to 10 mm wide, secondary lobules arising from margins in the centre of thallus, dichotomously divide up to 2 mm wide, lower surface mottled with or without rhizinae; from Karnataka*P. margaritatum* (Hue) Hale
15. Medulla P+orange-red, Protocetraric acid present16
- 15a. Medulla P-17
16. Marginal cilia dense, simple to bifurcate, 1-3 mm long, lobes 6-21 mm wide, faintly maculate, crenate-lobulate, soredia granular, Protocetraric and protolichesterinic acid present, from Nilgiri and Palni Hills, Nagaland*P. subarnoldii* (des. Abb.) Hale
- 16a. Marginal cilia sparse, confined in axils, simple, lobes rotund, emaculate, soredia farinise, only protocetraric acid present, from Assam*P. robustum* (Degel.) Hale
17. Medulla C+red, Gyrophoric or Lecanoric acid present18
- 17a. Medulla C-.....21
18. Upper surface maculate, Lecanoric acid present, lobes up to 20 mm wide, reticulately cracked in older parts; from Palni Hills*P. cooperi* (Steiner & Zahlbr.) Hale
- 18a. Upper surface emaculate, Gyrophoric acid present19
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- 19a. Medulla white-yellow, norlobaridone absent20
20. Marginal area on lower surface white mottled to pale brown, lobes 6-15 mm wide, emaculate, pigmented medulla K+ sorediate, lobes involute, from Nilgiri Hills, Kerala, Madhya Pradesh, Rajasthan, Darjeeling, Manipur, Kumaon Himalayas and Nepal*P. sanctae-angelii* (Lyngé) Hale
- 20a. Marginal area on lower surface brown to dark brown, lobes smaller up to 10 mm wide, pigmented medulla K-, from Darjeeling*P. permutatum* (Stirton) Hale
21. Medulla KC-, thallus mainly saxicolous, rarely terricolous, corticolous, lobes 4-10 mm wide, crowded, subimbricate, Atranorin and Protolichesterinic acid present; from Nilgiri and Palni Hills, Kumaon Himalayas*P. grayanum* (Hue) Hale
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- 23a. Maculae distinct on lobes, marginal zone on lower surface dark brown, lobes 10-15 mm wide, Alectoronic and α Collatolic acid present; from Nilgiri and Palni Hills, Kerala, Darjeeling, Madhya Pradesh, Maharashtra, Himachal Pradesh, Kumaon Himalayas*P. pseudonilgherrense* (Aşah.) Hale

24. *Soralia* P+ yellow, lobes 6-20 mm wide, marginal area on lower surface white mottled to brownish, sterile; from Nilgiri and Palni Hills, Nagaland*P. direagens* (Hale) Hale
- 24a. *Soralia* P-25
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- 25a. Marginal area on lower surface dark tan to brown black26
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- 26a. Lobes 4-10 mm wide, medulla KC+ red, Loxadic acid present, marginal area on lower surface brown to black; from E. Nepal.....*P. yodae* (Kurok.) Awasthi
27. Medulla K+ red (Salazinic acid present); from Arunachal Pradesh, Kerala, W. Bengal, Manipur, Nagaland*P. cristiferum* (Taylor) Hale
- 27a. Medulla K-29
28. Medulla P+ red (Protocetraric acid present), lobes 6-12 mm wide, emaculate or faintly maculate; from Nilgiri and Palni Hills, Kerala, Manipur, Himachal Pradesh, Jammu and Kashmir.....*P. dilatatum* (Vainio) Hale
- 28a. Medulla P-29
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- 29a. Medulla C-, KC-, Caperatic acid present, thallus adnate to be substratum, lobes 4-9 mm wide, imbricate, soralia linear, capitate or punctiform, marginal area on lower surface brown and shiny; from Nilgiri Hills, Kerala, Karanataka. Andhra Pradesh, Madhya Pradesh, Maharashtra, Himachal Pradesh, Jammu and Kashmir, Kumaon and Garhwal Himalayas*P. praesorediosum* (Nyl.) Hale
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- 30a. Lobe margin eciliate39
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- 31a. Medulla P-32
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- 32a. Medulla C-35
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- 33a. Upper surface faintly maculate34
34. Gyrophoric acid present, lobes 10-15 mm wide not lacinulate, marginal cilia 1-3 mm long, apothecia absent; from Nilgiri Hills*P. eunetum* (Stirton) Hale
- 34a. Olivetoric acid present, lobes 8-15 mm wide, becoming lacinulate-caniculate, marginal cilia 3-5 mm long, apothecia up to 10 mm diam, spores 24-35 x 12-18 μm ; from N.W. Himalayas*P. abnuens* (Nyl.) Hale.
35. Medulla KC-, Protolichesterinic acid present, upper surface maculate, lobes 6-12 mm wide; from Kumaon and Garhwal Himalayas, Assam, Himachal Pradesh, Andhra Pradesh*P. melanothrix* (Mont.) Hale
- 35a. Medulla KC+ red36
36. Upper surface white maculate, thallus coriaceous, lobes 7-20 (-30) mm wide, often convolute apothecia large upto 20 mm in diam., spores 12-28 x 10-24 μm , Alecoronic acid present; from Nilgiri and Palni Hills, Kerala, Darjeeling, Meghalaya, Manipur, Himachal Pradesh, Jammu and Kashmir,

- Kumaon and Garhwal Himalayas
P. nilgherrense (Nyl.) Hale
- 36a. Upper surface faintly maculate or emaculate37
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- 37a. Alecoronic acid absent, Norlobaridone and Cryptochlorophaeic acid present lobes up to 10 mm wide; from Tamil Nadu
P. abessinicum (Krempel) Hale
38. Lobes 10-15 mm wide, coarsely digitate-lobulate in centre, cilia sparse, 1-2 mm long, apothecia 8-12mm in diam., amphithecium maculate, spore 12-15 x 6-10 µm; from Nepal
P. maclayanum (Mull Arg.) Hale
- 38a. Lobes 4-8 mm wide, apothecia upto 10 mm diam., spores 16-18 x 8-10 µm; from Karnataka
P. vartakii Hale
39. Medulla K+ red, Salazinic acid present, lobes up to 20 mm wide, apothecia up to 16 mm diam., spores 16-29 X 13-18 µm, from W. Bengal
P. latissimum (Fee) Hale
- 39a. Medulla K-40
40. Medulla P+ orange-red, Protocetraric acid present, lobes 8-14 mm wide, margin lacinulate, apothecia present; from Nilgiri Hills
P. disparile (Nyl.) Hale
- 40a. Medulla P-41
41. Medulla C+ red, KC+ red, Lecanoric acid present, lobes 8-12 mm wide, apothecia stipitate, up to 15 mm diam., corticolous; from Palni Hills, Karnataka, Madhya Pradesh, Bihar, Himachal Pradesh, Kumaon Himalays, Orissa.....
P. andinum (Mull. Arg.) Hale
- 41a. Medulla C-, KC-, Caperatic acid present, lobes 5-8 mm wide, apothecia up to 8 mm diam., saxicolous; from Karnataka, Madhya Pradesh, Himachal Pradesh,
P. mesotropum (Müll. Arg.) Hale
- Punctelia* Krog., Nordic J. Bot. 2: 290. 1982
1. Thallus isidiate, isidia simple to coralloid, often lacinulate, lower surface pale brown, Lecanoric acid present, spore 11-17 x 5-9 µm, from Nilgiri Hill, Himachal Pradesh, Kumaon and Garhwal Himalayas
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- 1a. Thallus soresiate,2
2. Lecanoric acid present, lower surface pale brown, soralia generally laminal lobes 2-5 mm wide; from Nilgiri and Palni Hills, Himachal Pradesh, Kumaon Himalayas.....
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- 2a. Gyrophoric acid present, lower surface brown black to black, soralia generally marginal, lobes 2-6 mm wide, subrotund, from Kumaon and Garhwal Himalayas, Nilgiri and Palni Hills, Himachal Pradesh, Jammu and Kashmir.....
P. borreri (Sm.) Krog.
- Relcinia* (Hale and Kurok.) Hale, Phytologia 28: 484. 1974
1. Thallus isidiate, isidia simple, medulla K+ red. Norstictic acid present, lower surface black with brown marginal zone, lobes 1-2 mm wide, faintly maculate, spore 5-6 x 4-6 µm; from Kerala
R. abstrusa (Vainio) Hale
- 1a. Thallus isidate, isidia branched or coralloid, medulla K+ red, Norstictic and Stictic acid present, lower surface brown throughout, lobes 0.8-1.5 mm wide, sublinear, emaculate, spore 7-8 x 4-5 µm, from Kerala
R. syndneyensis (Gyelin) Hale
- Relicinopsis* Elix and Verdon, Mycotaxon 27: 281. 1986
1. Thallus isidiate, isidia globular to filiform, lobes 0.2-2 mm wide, linear, convex, apothecia up to 2 mm diam., spore 6-8 x 4-5 µm, corticolous; from Kerala
R. malaccensis (Nyl.) Elix & Verdon
- 1a. Thallus lacking isidia and soredia, lobes 0.5-2 mm wide, apothecia 2-4 mm diam, spores 5-7 x 3-5 µm, corticolous; from Andaman Island
R. intertexta (Mont. and Bosch.) Elix and Verdon
- Rimelia* Hale & Fletcher, Bryologist 93: 23-29. 1990
1. Thallus soresiate, soralia often confluent, sometimes capitate on narrow lobules, lobes 5-15 mm wide, with or without marginal cilia, medulla K+ red, Salazinic acid present; from Palni Hills, Kerala.

Madhya Pradesh, Jammu and Kashmir, Himachal Pradesh, Kumaon and Garhwal Himalayas*R. reticulata* (Taylor) Hale & Fletcher

- 1a. Thallus lacking isidia and soredia, medulla K+ red, Salazinic acid present, lobes ciliate along margins, lower surface rhizinate up to the margins; from Pennisular Indian*R. cetrata* (Ach.) Hale & Fletcher

Xanthoparmelia (Vainio) Hale, *Phytologia* 28: 485, 1974.

1. Thallus isidiate2
- 1a. Thallus lacking isidia, medulla K+ red, P+ orange-red, Salazinic acid present, lobes 1-3 mm wide, often with secondary lobules, thallus ± pulvinate, saxicolous; from Himachal Pradesh, Jammu and Kashmir, Kumaon Himalayas*X. tractica* (Kremp.) Hale
2. Medulla K+ yellow, Stictic acid present, lobes up to 0.5 mm wide, isidia rounded verrucose, lower surface brown to dark-brown or black; from Palni Hills, Karnataka, Madhya Pradesh, Rajasthan, Kumaon Himalaya*X. congensis* (Stein) Hale
- 2a. Medulla K+ red, salazinic acid present3
3. Lower surface black, marginal area brown, margin not black rimmed, isidia simple, globular to cylindrical; from Jammu and Kashmir, Himachal Pradesh, Kumaon and Garhwal Himalayas*X. tinctina* (Mah & Gill) Hale
- 3a. Lower surface pale brown, marginal apices black rimmed, isidia brown tipped, simple, often globose, subcoralloid4
4. Medulla white, K+ yellow to red, P+ intense yellow, Usnic acid, Salazinic acid, Consalazinic acid and Norstictic acid (trace) present; from Nepal*X. coreana* (Gyeln.) Kurok.
- 4a. Medulla white, in part of lower half yellow to orange-yellow, K+ yellow to red, P+ intense yellow, yellow lower medulla K+ purple, Usnic, Salazanic, Consalazinic and Norstictic acid (trace) and skyrin present; from C. Nepal

X. nepalensis Sharma & Kurokawa

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