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Canoparmelia

Genus with 33 corticolous or saxicolous species. All of them containing isolichenan in their cell walls. Most of them are grey (atranorin), rarely greenish (usnic acid).

Collective attributes: upper side grey, maculose, corrugated and fissured in older parts; lobes without cilia; lower side black with brownish fringe / edge-zone; rhizines black, often with a white tip, unbranched, extending to the peripheral parts

Key according to Elix (1994), Swinscow & Krog (1988).

1a without isidia, soredia present

2a medulla P+ orange, K+ yellow, containing stictic acid; upper cortex significant netlike wrinkled (reticulate) and grooved, maculate and fissured; lobes 4-8 mm broad, deeply incised; soralia on the whole surface, punctiform or spreading along the fissures and wrinkles irregularly. Chemistry: K yellow/yellow, C -/-, KC -/-, P -/orange; atranorin, chloroatranorin, stictic-, constictic-, cryptostictic acid. (A-,M+,C+)

Canoparmelia crozalsiana (de Lesd.) Elix et al.

2b medulla P-, without stictic acid; upper cortex not netlike wrinkled and grooved

3a medulla KC-, without glomelliferic acid; peripherial lobes often with some brownish tinge, 3-7 mm broad, sometimes roof-tiled or bearing lobules, borders normally rolled downward; upper surface maculate, fissured and wrinkled; soralia on the whole surface, punctiform or arising from small blains / pustules, growing together in older parts of the thallus. Chemistry: K yellow/-, C -/-, KC -/-, P -/--; atranorin, chloroatranorin, divaricatic-, nordivaricatic-, stenoporic acid. (A-,M-,C+)

Canoparmelia texana (Tuck.) Elix & Hale

3b medulla KC+ orange, containing glomelliferic acid; to be separated from the former species only by its KC-Reaction, but of similar appearance. Chemistry: K yellow/-, C -/-, KC -/pink, P -/--; atranorin, chloroatranorin, glomelliferic acid, perlatic acid, stenoporic acid. Unknown from Macaronesia

Canoparmelia aptata (Kremp.) Elix & Hale

1b without soredia, but with isidia, P-; isidia laminal, slender, cylindrical; upper surface more or less maculate, fissured and wrinkled in its central parts. Chemistry: K yellow/-, C -/ or somewhat reddish, KC -/--; atranorin, perlatic, stenoporic, glomelliferic acid. (A+,M-,C-)

Canoparmelia carolineana (Nyl.) Elix & Hale

Partly translated keys to:

F. SCHUMM: Flechten Madeiras, der Kanaren und Azoren. – 2008

2/19

and *Canoparmelia amabilis* (Nyl.) Elix & Hale

Coccocarpia, Degelia

The distinction of the photobionts in the lichens is sometimes not easy

Nostoc: cells spherical, „string of pearls“, 3-7 µm, heterocysts essential bigger than the other cells, trichomes (threads) not branched

Scytonema: cells oval to cylindrical, „stack of coins“, 5-25 µm, heterocysts nearly as big as the other cells, trichomes fictitiously branched (in lichens difficult to see)

1a Th. granular, small scaly, or with very small lobes at the margins; upper cortex anticlinal paraplectenchymatous; medulla irregularly interwoven hyphae; Photobiont: *Nostoc*; apothecia lecanorine or biatorine; many species with pannarin (P+ yellow) and triterpenoids

Pannaria, Parmeliella

1b Th. leave-like or robust monophyll-placodious, with well developed lobes at the margins

2a upper cortex in longitudinal sections built from rows of rectangular cells, which are orientated parallel to the surface (periclinale paraplectenchym); photobiont: *Scytonema*. without pannarin (P-)

3a apothecia convex, strongly adpressed, often a little lobate, margo proprius very thin and hidden under the apothecium

Coccocarpia

4a with isidia *C. palmicola* (Spreng.) Arv. & D.J.Galloway

4b without isidia *C. erythroxyli* (Spreng.) Swinscow & Krog

3b apothecia sitting, concave, with margo proprius, lighter and easy to be seen

Degelia sect. *Degelia*, S. Hemisphere species

2b upper cortex in longitudinal sections built from rows of isodiametral cells, orientated perpendicular to the surface (anticlinal paraplectenchym); photobiont: *Nostoc*. P+ oder -

5a hyphae of the medulla in longitudinal sections orientated parallel to the surface (periclinal), nearly without branches; Th. monophyllous-placodious to *Coccocarpia*-like; apothecia biatorine (=exciple without algae), with lighter margo proprius

Degelia Sect. *Amphiloma*
(= *Parmeliella plumbea* Gruppe)

6a Th. with isidia or schizidia

7a Th. with erect, flattened schizidia

Degelia ligulata P.M.Jørg. & P.James

7b Th. with rounded, globular isidia

Degelia atlantica (Degel.) P.M.Jørg. & P.James

6b Th. without isidia or schizidia

Degelia plumbea (Lightf.) P.M.Jørg. & P.James

5b hyphae of the medulla in longitudinal sections irregular interwoven and branched; Th. granular, scaly or with marginal lobes; apothecia

biatorine (*Parmeliella*)
or lecanorine (*Pannaria*)

Degelia

1a Th. with isidia or schizidia

2a Th. with ± erect, flattened schizidia. (A+,M+,C-)

Degelia ligulata P.M.Jørg. & P.James

2b Th. with ± rounded isidia

3a isidia button-like or globular, Th. with fine longitudinal stripes, th.-edges thick and often turned up. N-Hemisphere, (A+,M+,C+)

Degelia atlantica (Degel.) P.M.Jørg. & P.James

3b isidia thinner, coralloid branched, Th. nearly knit with stripes, th.-edges often turned down; S-Hemisphere, not known from Macaronesia

(*Degelia durietzii* Arv. & D.J.Galloway)

1b Th. without isidia, without schizidia

4a Apothecia only with margo proprius. (A+,M+,C+)

Degelia plumbea (Lightf.) P.M.Jørg. & P.James

4b Apothecia with margo proprius and additional a crownlike margo thallinus; species of the S. Hemisphere

Lit.: Jørgensen, P. M. & James, P. W. (1990)

Flavoparmelia

Lit.: Elix (1993), Poelt (1981)

Both species of the region with soralia und without apothecia.

1a medulla K+ yellow, then red, C-; lobes tightly adnate; with salazinic acid. (A+,M-,C+)

Flavoparmelia soledians (Nyl.) Hale

1b medulla K- or yellowish, C-; lobes loosely adnate; with protocetraric acid. (A+,M+,C+)

Flavoparmelia caperata (L.) Hale

Heterodermia

1a Th. fruticose

2a Undersurface white

3a mit Salazinsäure; Unterseite K+ gelb dann rasch blutrot. (A+,M+,C+)

Heterodermia leucomelos (L.) Poelt

3b ohne Salazinsäure; Unterseite K+ gelb aber nicht rot werdend. (A-,M-,C+)

Heterodermia boryi (Fée) K.P.Singh

2b Undersurface with coloured pigment (hyphae)

4a Pigment red, K+ purpur violet. (A-,M-,C-)

Heterodermia vulgaris (Vain.) Follmann & Rédon

4b Pigment yellow K- (A+,M-,C-)

Heterodermia lutescens (Kurok.) Follmann

1b Th. foliose

5a Undersurface corticate, with rhizines

6a Undersurface archnoid corticate -> *Heterodermia spathulifera* Moberg & Purvis

6b Undersurface smooth corticate

7a with cylindrical isidia. (A+, M+, C+)

Heterodermia isidiophora (Nyl.) D.D.Awasthi

7b with soralia

8a Medulla K+ yellow (A+,M+,C+)

Heterodermia speciosa (Wulfen) Trevis.

8b Medulla K+ yellow>red. (A+,M-,C+)

Heterodermia albicans (Pers.) Swinscow & Krog

5b Undersurface not corticate

9a without soralia, most with apothecia. (A-,M-,C+)

Heterodermia hypoleuca (Ach.) Trevis.

9b with soralia

10a Undersurface white

Heterodermia galactophylla (Tuck.) W.L.Culb.*Heterodermia japonica* (M.Satô) Swinscow & Krog

10b Undersurface with coloured pigment (hyphae)

11a Medulla K+ yellow>red. (A-,M+,C-)

Heterodermia propagulifera (Vain.) J.P.Dey

11b Medulla K- or + yellow (A+,M+,C+)

Heterodermia obscurata (Nyl.) Trevis.

Hypogymnia

Lower surface without rhizinae, black, attached to the substratum by adhesive discs or rarely by whole lower cortex.
Literatur: Hawksworth (1973), Tavares (1952)

1a Th. without soralia or isidia, lobes rather narrow, corticolous

2a medulla P- (without physodalic acid). (A-,M+,C+)

Hypogymnia madeirensis (Tav.) D.Hawksw.

2b medulla P+ yellow (with physodalic acid). (A-,M-,C+)

Hypogymnia tavaresii D.Hawksw. & P.James

1b Th. with soralia

3a soralia only at the ends of the lobes

4a lobes in the centre ascending, tubular, at the ends with capitate soralia on the upper cortex. (A-,M+,C+)

Hypogymnia tubulosa (Schaer.) Hav.

4b lobes not ascending (only tips), at the ends with lip-shaped soralia developing from the rupture of the underside-tips of the lobes

5a medulla P-; soralia like a ring around the rupture at the end of the lobes between upper and under surface. (A-,M+,C+)

Hypogymnia vittata (Ach.) Parrique

5b medulla P+ orange; soralia more lip-shaped, developing more on the upper part of the rupture. (A-,M+,C+)

Hypogymnia physodes (L.) Nyl.

3b soralia on the upper surface of the lobes not only at the ends, corticolous. (A-,M-,C+)

Hypogymnia laminisorediata D.Hawksw. & Poelt

Hypotrachyna

Literature: Sipman (1998), Swinscow & Krog (1988), Poelt (1969), Elix (1994).

1a upper surface yellowish green (usnic acid)

2a Th. with cylindrically laminal or marginal isidia; Chemistry: K -/yellow>red, C -/-, P -/orange,. (A+,M-,C-),

Hypotrachyna microblasta (Vain) Hale

2b Th. at the ends of the lobes with farinose nearly capitate soralia; Chemistry: K -/ yellow>red, C -/-, P -/orange, UV -/-.(A+,M+,C+)

Hypotrachyna sinuosa (Smith) Hale

1b upper surface whitish to grey

3a without soralia, without isidia; the separation of the following 2 species, if one wants to accept them, is not clear.

4a upper surface brittle (A-,M+,C-).

Hypotrachyna taylorensis (M.E.Mitch.) Hale

4b upper surface not brittle (A+,M-,C-)

Hypotrachyna pulvinata (Fée) Hale

3b with isidia or soralia

5a Th. with isidia, without soralia

6a isidia at the margins, ± small lobulate at the ends, C -/redanziaic acid. (A-,M+,C-),

Hypotrachyna prolongata (Kurok.) Hale

[= *H. rachista* (Hale) Hale]

6b isidia mostly on the upper surface

7a medulla KC+ orange (barbatic acid); Chemistry gelb/-, C -/-, KC -/yellow-orange, P -/-. (A+,M-,C-)

Hypotrachyna imbricatula (Zahlbr.) Hale

7b medulla KC-; Chemistry: K yellow/-. C -/-, KC -/-, P -/-. UV (A-,M-,C-)

Hypotrachyna costaricensis (Nyl.) Hale

5b Th. soresiosus or pustulate (blister-like)

8a medulla with yellow or salmon pigment, that becomes more yellow with K; soralia capitate usually at the ends of the lobes but also like pusteles on the surface (A+,M+,C+)

Hypotrachyna endochlora (Leight.) Hale

8b medulla white

9a medulla C-, KC-, P+ orange, Th. tightly adnate. (A+,M-,C+)

Hypotrachyna pseudosinuosa (Asahina) Hale

9b medulla C+ or KC+ red or orange, P-

10a soralia diffuse expanded, mostly near the ends; lobes beneath the soralia often bent down; lobes, 1-4 mm wide; upper surface tiny maculate; (A+,M+,C+)

Hypotrachyna revoluta (Flörke) Hale

10b soralia well delimited, often capitate or globose, often at the end (nead TLC for exact separation)

11a medulla C- (or orange), KC+ orange, (A+,M+,C+)

Hypotrachyna laevigata (Sm.) Hale

11b medulla C+ pink-red, KC+ red, (A+,M+,C+)

Hypotrachyna rockii (Zahlbr.) Hale

Lobaria

1a Th. with bluegreen algae, without green algae, with soralia at the margins or/and on the upper side; upperside particularly at the margins fine rough (pocket-lens!) and matt; scrobiculin, usnic acid, stictic acid, norstictic acid; medulla: K+ yellow to orange, C-, KC+ red or disappearing orange, P+ orange or pale orange; cortex: K+ yellow. (A+,M+,C+)

Lobaria scrobiculata (Scop.) DC.

1b Th. with green algae; bluegreen algae only in cephalodia; with or without soralia; other chemistry

2a upper surface plane, not strong reticulate or foveate; without isidia and soredia; Spores acicular oder fusiform; Norstictin-, Stictin-, Constrictinsäure vorhanden oder fehlend; Mark K+ oder K-, P+ oder P-

3a with scrobiculin; upper side often very fine warty (magnifier 80x!), with black cephalodia; Spores acicular. (A-,M+,C+)

Lobaria amplissima (Scop.) Forssell

3b without scrobiculin; upperside smooth, at least partly shiny, wet green, without small branched brown cephalodia; spores acicular or fusiform

4a without gyrophoric acid etc.; medulla and cortex K-, C-, KC-, P-; Spores fusiform, 1-septate; dry upper surface dark olive green, wet green, (A+,M+,C+)

Lobaria virens (With.) J.Laundon

4b with gyrophoric- and 4-O-methylgyrophoric acid; Medulla K+ yellow, C+ red, KC+ red, dry upper side silver grey. (A-,M+,C-)

Lobaria sublaevis (Nyl.) Tav.

2b Upper surface strongly reticulate and foveate, with isidia and/or soralia; Spores fusiform; with norstictic, stictic, constrictic acid; medulla: K+ yellowish then turning slowly red, P+ orange

5a Thallus without soralia but with mostly flat marginal isidia; mit Gyrophorsäure; medulla and often lower surface: C+ rot (sometimes quickly disappearing!), KC+ rot. (A+,M+,C+)

Lobaria immixta Vain.

5b Thallus with or without soralia, isidia cylindric, mostly on the ridges; without gyrophoric acid; Mark: C-, KC-. (A+,M+,C+)

Lobaria pulmonaria (L.) Hoffm.

6a with soralia intermixed with short isidia

f. *pulmonaria*

6a with long isidia, soralia only on old lobes; mainly mediterranean

f. *papillaris* (Del.) Hue

Nephroma

T1= peltidactylin = 7β-acetoxihopan-22-ol
 T2= dolichrrhizin = 15a-acetoxihopan-22-ol
 T3= Zeorin = hopane-6a,22-diol
 T4= hopane-7β,22-diol
 T5=hopane-15,22-diol
 T6=hopane-6a,7β,22-triol

Folioles = very small lobes, mostly at the edges. **Tomentum** = grown with dense small hairs

1a Photobiont green algae; Not in the Azores.

2a Th. yellow, subarctic-alpin. (A-, M-, C-)

Nephroma arcticum (L.) Torss.

2b Th. green-brown, arctic-alpine. (A-,M-,C-)

Nephroma expallidum (Nyl.) Nyl.

1b Photobiont blue-green algae

3a with soralia or isidia, without foliolae, without or seldom apothecia

4a with soralia, mostly marginal but also on the surface (laminal), Soredia granulose; upper surface even or a bit reticulate; with (1, abundant race:) T2, T3, T5, (2, seldom race:) T1, T3, T4, T6; (A-,M+,C+)

Nephroma parile (Ach.) Ach.

4b with coralloid isidia, without soralia; upper surface reticulate-foveate

5a Th.-margins, entire, isidia in groups on the ridges of the surface; lower surface at the edges naked not tomentosus; mit T3, T4, T5, T6. (A-,M-,C-)

Nephroma sulcatum P.James & F.J.White

5b Th.-margins entire or somewhat crenulate t, isidia ± equal distributed, first on the ridges but later at all places of the upper surface; lower surface with tomentum reaching to the margins; mit T1, T4; arktisch-montan, seldom. (A-,M-,C-)

Nephroma isidiosum (Nyl.) Gyeln.

3b without soralia, without isidia, Th. often with folioles or apothecia

6a medulla (pale) yellow, K+ red (Anthrachinone); upper and lower surface without tomentum; mit T6 und/oder T3

7a medulla pale yellow, at least in parts; upper surface reticulate; foliolae at the margins seldom; with Hopan-Triterpenoid T3(Zeorin) and further unknown substances. (A+,M-,C-)

Nephroma venosum Degel.

7b medulla yellow, upper surface non reticulate; with or without foliolae at the margins; T6

8a apothecia often, without foliolae (seldom with lobuli of regeneration); T6; oceanic. (A-,M+,C+)

Nephroma laevigatum Ach.

8b apothecien seldom, with numerous, marginal or also laminal foliolae; T3 and T6; oceanic. (A-,M+,C+)

Nephroma tangeriense (Maheu & A.Gillet) Zahlbr.

6b medulla white, K- (without Anthrachinone); upper and lower surface with or without tomentum

9a lower surface with distinct short hairs, with pale papillae; upper surface fine to strongly with short hairs, velvety; without lichen substances; hemiboreal-alpine. (A-,M+,C+)

Nephroma resupinatum (L.) Ach.

9b lower surface smooth, or if with hairs then without papillae; upper surface ± smooth or only weak hairy; with Hopan-Triterpenoids

10a lower surface with dense hairs

11a margins of the apothecia distinct comb-like crenulate, and on the outer side with hairs; upper surface smooth or tiny tomentose, seldom with flat isidia on the surface; with T1 and T4; boreal-gemäßig, rare. (A+,M+,C+)

Nephroma helveticum Ach.

- 11b margins of the apothecia entire not crenulate; upper surface reticulate-wrinkled, sometimes with foliolae at the edges; with T3, T4, T5, T6. (A-,M+,C-)
Nephroma areolatum P.James & F.J.White
- 10b lower surface smooth or only seldomly with some hairs
- 12a without folioles; margins of the apothecia entire
- 13a with T2, T3, T5 (selten T1, T2, T3, T4, T5, T6 in Nord Amerika); boreal (A-,M-,C-)
Nephroma bellum (Spreng.) Tuck.
- 13b with T6, species (8a) without pigments in the medulla; Macaronesia, west. Europe, rare
Nephroma laevigatum Ach.
[= *Nephroma lusitanicum*]
- 12b often with folioles (marginal and/or laminal); margins of the apothecia entire or with small foliolae
- 14a upper surface reticulate, with folioles \pm on the ridges of the net; margins of the apothecia wide, with foliolae; without or only seldom with pycnidia; with T1, T3, T4, Z6. (A+,M-,C-)
Nephroma hensseniae P.James & F.J.White
- 14b upper surface not reticulate, with dispersed folioles on the surface and the margins; margins of the apothecia small, entire or crenulate; often with pycnidia; with T3 (=Zeorin), rare (A-,M+,C+)
Nephroma foliolatum P.James & F.J.White

Lit.: James, P.W., White, F.J. (1987), Wetmore (1960)

Pannaria/Parmeliella

This is an unusual grouping (P+/- at the beginning) of the *Pannaria/Parmeliella*-species from Laurimacaronesia, which should be a help together with the keys of Jorgensen.

- 1a Th. P+ orange (Pannarin)
 2a without isidia/soredia *Pannaria rubiginosa* (Ach.) Bory
- 2b with isidia/soredia
 3a with isidia, which becomes sorediose and with disappearing cortex at the tips (= Gymnidia)
Pannaria conoplea (Ach.) Bory
- 3b isidien not sorediose, with cortex
Pannaria tavaresii P.M.Jørg.
- 1b Th. P- (without pannarin)
 4a Th. with Isidia/Soredia/Schizidia
 5a Th. with round isidia, or flatted schizidia, without soredia
 6a Th. strong placodioid (*Coccocarpia*-like), with fine longitudinal stripes
 7a Th. with erect, flatted schizidia
Degelia ligulata P.M.Jørg & P.James
- 7b Th. mit round globular odr button-like isidia
Degelia atlantica (Degel.) P.M.Jørg.
- 6b Th. not so
Parmeliella triptophylla (Ach.) Müll.Arg.
- 5b Th. with soredia, or the cortex of the isidia is not dense but becomes cotton like and sorediosus
 7a Hymenium J+ first blue then quick red
Fuscopannaria atlantica P.M.Jørg. & P.James
Fuscopannaria mediterranea (Tav.) P.M.Jørg.
- 7b Hymenium J+ blue and remaining blue
Parmeliella parvula P.M.Jørg.
Parmeliella testacea P.M.Jørg.
- 4b Th. without Isidia/Soredia
 8a Hymenium J+ blue and remaining blue
 9a Thallus strong placodioid (*Coccocarpia*-like), with fine longitudinal stripes
Degelia plumbea (Lightf.) P.M.Jørg.
- 9b Thallus anders
 10a Photobiont green algae
Psoroma hypnorum (Vahl) Gray
- 10b Photobiont bluegren algae (Cyanobacteria: *Nostoc*)
Pannaria pezizoides (Weber) Trevis.
Parmeliella nigrocincta (Mont.) Müll.Arg.
- 8b Hymenium J+ blue, then quick red; *Fuscopannaria*
Fuscopannaria leucophaea (Vahl) P.M.Jørg.
Fuscopannaria leucosticta (Tuck) P.M.Jørg.
Fuscopannaria olivacea (P.M.Jørg.) P.M.Jørg.
Fuscopannaria saubinetii (Mont) P.M.Jørg.

Parmelina und *Parmelinopsis*

Lit.: Hale (1976), Elix (1994), Poelt (1977).

1a Th. without isidia, without soredia, lobe axils round with very short black cilia; Chemistry: Atranorin, Lecanoric acid, K yellow/-, C -/red, KC -/red, P -/

Parmelina quercina (Willd.) Hale

1b Th. with isidia or soralia

2a Th. with soredia, medulla C+ rosa; gyrophoric acid

3a Rhizinae simple, th. stong adnate on bark, thallus 1-3 cm wide, lobes nearly linear, 1-2 mm wide; cilia at the margin scanty developed, 0,1-0,3 mm long; upper surface even to convex, at the tips with soredia, soralia capitate, to 1 mm wide; sordiate ends of lobes bent down; lower surface black, scanty rhizinous; rhizinar black, simple; spec. looks like a poorly developed *Hypotrachyna revoluta*; Chemistry: Atranorin, Gyrophoric acid, K+ yellow/-, C -/pink, KC -/red, P -/-. (A+,M-,C-)

Parmelinopsis cryptochlora (Vain.) Elix & Hale

or (A+/M-/C-;2003) *Parmelinopsis subfatiscens* (Kurok.) Elix & Hale

3b Rhizinae forked or dichotomously branched, without cilia, compare with *Hypotrachyna*

2b Th. with isidia

4a Isidia cylindric, often with black short cilia at the tips; Chemistry: ± Gyrophoric acid, Atranorin, K yellow/-, C -/-, KC -/red, P -/-, UV -/-. (A+,M+,C+)

Parmelinopsis horrescens (Taylor) Hale & Elix

[= *Parmelia dissecta* Nyl.]

4b Isidia cylindric, without black cilia at the tips; medulla K- or pale yellow, C+ red or pink

5a isidia at the tips flat, button-like, black, similar to *Parmelina tiliacea*; Chemistry: Atranorin, Lecanoric acid, K yellow/-, C -/red, KC -/red, P -/

Parmelina pastillifera (Harm.) Hale

5b isidia zylindrisch, not button-like and black at the tips

6a medulla C+ intense red (Lecanoric acid), Cilia simple, black, 0,2-0,7 mm, mostly in the lobe axils; Chemistry: Atranorin, Lecanoric acid, K yellow/-, C -/red, KC -/red, P -/-. (A-,M+,C+)

Parmelina tiliacea (Hoffm.) Hale

6b medulla C+ pink (Gyrophoric acid), lobes very small, 1-2 mm wide; lichen very similar to (4a), but cilia only on the surface and margins and not on the tips of the isidia; Chemistry: Atranorin, Gyrophoric acid, K yellow/-, C -/pink, KC -/red, P -/-, UV -/-. (A+,M+,C+)

Parmelinopsis minarum (Vain.) Elix & Hale

[= *Parmelia dissecta* auct. non Nyl.]

Parmotrema

Lit.: Swinscow & Krog (1988), Elix(1994), Poelt & Vezda (1981), Sipman (1998).

- 1a Th. with very distinct oval, rounded, or reticulate pseudocyphellaen: compare with *Rimelia* and *Cetrelia*
- 1b Th. only little white maculate
- 2a Th. without soralia, without isidia
- 3a medulla P+ orange. (A+,M+,C+)
- 3b medulla P-. (A-,M-,C+)
- P. perforatum* (Jacq.) A.Massal.
- P. nilgherrense* (Nyl.) Hale
- 2b Th. with soralia or isidia
- 4a Th. only with isidia (exception: *P. melissii* can get soresiose)
- 5a Th. green-yellow (usnic acid). (A-,M-,C+)
- P. conformatum* (Vain.) Hale
- 5b Th. grey
- 6a Th.-margin without cilia, medulla C+ red. (A+,M+,C+)
- P. tinctorum* (Despr. ex Nyl.) Hale
- 6b Th.-margin with cilia
- 7a medulla UVL bright yellow (lichexanthone). (A+,M-,C-)
- P. ultralucens* (Krog) Hale
- 7b medulla without lichexanthone
- 8a medulla K-, P-, KC+ rot. (A-,M-,C+)
- P. melissii* (Dodge) Hale
- 8b medulla P+ orange
- 9a medulla K+ yellow after long time red, KC-. (A+,M+,C+)
- P. crinitum* (Ach.) Hale
- 9b medulla K+ gelb and quick turning red, KC+ rot. (A-,M-,C+)
- Canomaculina subtinctorium* (Zahlbr.) Elix
- 4b Th. with soralia
- 10a medulla K+ yellow then quick red up to redbrown, KC+ rot (Salazinic acid)
- 11a upper surface reticulate-maculate up to fine reticulate-fissured; rhizinae mostly also near the lower margins. (A+,M+,C+)
- Rimelia reticulata* (Taylor) Hale & Fletcher
- 11b upper surface fine maculate like points; margins of the lower surface nude and nearly without rhizinae; 0,5-1 cm wide. (A+,M+,C+)
- P. stuppeum* (Taylor) Hale
- 10b medulla K- oder K+ gelb (or after hours red)
- 12a medulla K+ yellow, after hours red, KC-, with stictic acid. (A+,M+,C+)
- P. chinense* (Osbeck) Hale & Ahti
und *P. bangii* (Vain.) Hale
- 12b medulla K-, without stictic acid
- 13a medulla C+ red, with lecanoric acid. (A-,M-,C+)
- P. austrosinense* (Zahlbr.) Hale
- 13b medulla C-, without lecanoric acid
- 14a medulla P+ red, K-, C-, KC+ red, with protocetraric acid. (A+,M+,C+)
- P. robustum* (Degel) Hale
- 14b medulla P-, without protocetraric acid
- 15a medulla K-, P-, C-, KC+ pinkish (often unclear), soralia UVK+ bright white, mit alectoronic-, a-collatolic acid. (A+,M+,C+)
- P. arnoldii* (Du Rietz) Hale
und *P. melissii* (Dodge) Hale
- 15b soralia in UVK not bright white only grey, K-, P-, C-, KC-, with protolichesterinic acid. (A-,M+,C+)
- P. grayanum* (Hue) Hale

Punctelia

Lit. Hale (1965), Swinscow & Krog (1988), Adler & Ahti (1996), Herk & Aptroot (2000), Longán et al. 2000, Aptroot (2003),

1a Th. yellowish or yellowish green; with usnic acid

2a without soredia or isidia. (A-,M-,C-)

Flavopunctelia praesignis (Nyl.) Hale

2b with soredia (A-,M-,C-)

Flavopunctelia flaventior (Stirt.) Hale

1b Th. grey or grey-green; without usnic acid

3a without sordia, isidia or phyllidia

4a Lower surface pale brown, with lecanoric acid and atranorin, K yellow/-, C -/red, P -/-. (A-,M-,C-)

Punctelia semansiana (C.F.Culb. & W.L.Culb.) Krog

4b Lower surface black, with gyrophoric acid and atranorin, K yellow/-, C -/pink, KC -/pink, P -/-. (A-,M-,C-)

Punctelia subpraesignis (Nyl.) Krog

3b with soredia or isidia or phyllidia

5a with isidia or phyllidia

6a. Th. with wart isidia, saxicolous, Atranorin. K yellow/-, C -/red, P -/-. (A-,M-,C-)

Punctelia punctilla (Hale) Krog

6b Th. with coralloid isidia or phyllidia, corticolous

7a Lower surface pale brown, with lecanoric acid, Atranorin, K yellow/-, C -/red, KC -/orange, P -/-. (A-,M-,C+)

Punctelia rudecta (Ach.) Krog

7b Lower surface black, with gyrophoric acid, Atranorin, K yellow/-, C -/pink, KC -/pink, P -/-. (A-,M-,C-)

Punctelia constantimontium Sérus.

5b with soredia but without isidia or phyllidia

8a medulla C+ pink or red, KC+ red

9a lower surface pale brown, medulla C+ rot, with lecanoric acid, atranorin, ±

Protolichesterinsäure, K yellow/-, C -/carmine-red, KC -/red, P -/-, UV -/-. (A-,M+,C+)

Punctelia subrudecta (Nyl.) Krog

und *Punctelia ulophylla* (Ach.) v. Herk & Aptroot

9b lower surface black, medulla C+ pink, with gyrophoric acid

10a upper surface grey, mostly corticolous, widespread; atranorin, gyrophoric acid,

K yellow/-, C -/pink, KC -/pink, P -/-. (A-,M-,C+)

Punctelia borreri (Sm.) Krog

10b upper surface at the margins brown, saxicolous, atranorin, gyrophoric acid, K yellow/-,

C -/pink, KC -/pink, P -/-. (A-,M+,C-)

Punctelia stictica (Delise ex Duby) Krog

8b medulla C-, KC-, without lecanoric -, without gyrophoric acid

11a lower surface pale brown, atranorin, ± fatty acids (caperatic), K yellow/red (pigments), C -/-,

KC -/-, P -/-. (A-,M-,C-)

Punctelia neutralis (Hale) Krog

11b lower surface black, atranorin, fatty acids, K yellow/-, C -/-, KC -/-, P -/-, UV -/-. (A-,M+,C-)

(A-,M+,C-)

Punctelia reddenda (Stirt.) Krog

Pyxine etc.

Lit.: Awasthi (1975), Kalb (1987), Moberg (1983), Swinscow et al (1975, 1978)

- 1a upper surface UV+ bright yellow (lichexanthone)
2a without soredia or dactyls (= Polysidiangia). Not keyed
2b with soredia or dactyls
3a medulla white. (A+,M+,C+)
Pyxine cocoes (Sw.) Nyl.
- 3b medulla yellow
4a with soralia. (A-,M+,C+)
Pyxine subcinerea Stirt.
- 4b with dactyls. (A-,M-,C+)
Pyxine physciaeformis (Malme) Imshaug
- 1b upper surface UV-
5a medulla yellow; th. with soralia; K yellow/-, P-/-. (A+,M+,C+)
Pyxine soreciata (Ach.) Mont.
- 5b medulla white
6a Th. without rhizinae, only fixed with small warts; lobes dense and conglutinated; with divaricatic acid; K yellow/-, P-/-. (A+,M+,C+)
Dirinaria applanata (Fée) D.D.Awasthi
- 6b Th with rhizinae, without divaricatic acid
7a Th without soralia (but isidia may be) -> not keyed out
7b Lager with soralia
8a lower cortex consisting of isodiametral cells (paraplectenchymatisch), black, soralia on the upper surface. (A+,M-,C-)
Physcia erumpens Moberg
- 8b lower cortex consisting parallel small hyphae (prosoplectenchymatisch) black or whitish
9a lower cortex black, at the margins ± striped; soralia at the margins of the lobes. (A+,M-,C-)
Physcia atrostriata Moberg
- 9b lower cortex whitish up to greyish
10a upper surface with white points; soralia capitate or lip-like. (A+,M+,C+)
Physcia caesia (Hoffm.) Fürnr.
- 10b upper surface matt, not with white points; soralia at the margins of the lobes. Portugal.
(A+,M-,C-)
Physcia undulata Moberg

Rimelia

Upper surface grey, fine white reticulate-maculate, becoming fine fissured

Lit.: Hale & Fletcher (1990)

1a Thallus with isidia or soralia

2a medulla K+ yellow then becoming quickly red, KC+ red, P+ orange. (salazinic acid)

3a Thallus with isidia. (A+,M-,C-)

Rimelia subisidiosa (Müll.Arg.) Hale & A.Fletcher

3b Th. with soredia

4a lower surface with rhizinae up to the margins; cilia well developed. (A+,M+,C+)

Rimelia reticulata (Taylor) Hale & A.Fletcher

4b lower surface at the margins nude, without rhizinae; cilia often sparse; (not well defined species).

(A+,M-,C+)

Rimelia olivaria (Ach.) Hale & A.Fletcher

[= *Parmotrema pseudoreticulatum* (Tav.) Hale]

[= *Parmelia pseudoreticulata* Tav.]

2b medulla K-; no known species from the Azores

1b Thallus without isidia, without soredia

5a medulla K+ yellow, then red, KC+ red, P+ orange. (salazinic acid). (A-,M+,C+)

Rimelia cetrata (Ach.) Hale & A.Fletcher

5b medulla K-; until now no species known from Macaronesia

Roccella

Lit.: z.B. Follman (1993), Peine (1995)

1a without soralia, with apothecia

2a Th.flat; Spores 18-24 x 4-7 µm; C -/-, K -/-, J -/-/violet

Roccella hypomecha (Ach.) Bory

2b Th. ± round

3a C red/-, K yellow to red/-; hyphae *Tinctoria*-Type; Spores 23-27 x 6-8 µm;***Roccella tinctoria*** DC. em. Vain.3b C -/red-, K -/-; hyphae *Canariensis*-Type; Spores 21-27 x 5-8 µm;***Roccella canariensis*** Darb. em. Vain.

1b with Soralia

4a Basis ochraceous; C red/red-, K ± yellow/-, J -/-/brown; Soralia C- or C+ red; hyphae *Tinctoria*-Type***Roccella phycopsis*** Ach.[= ***Roccella fucoides*** Vain.]

4b Basis not yellow

5a Th.flat

6a th C+ red

7a C red/red-, K -/-; Thallus soft

Roccella linearis (Ach.) Vain.

7b C red/-, K yellow/-; Thallus hard

Roccella maderensis (J.Steiner) Follmann

6b Th C-

8a Soralia C+ red

9a Medulla J+ violet; Spores 23-27 x 7-9 µm

Roccella fuciformis (L.) DC.

9b Medulla J-

Roccella teneriffensis Vain.

8b Soralia C-

Roccella immutata (J.Steiner) Follmann

5b Th round

10a C red/-, hyphae *Tinctoria*-Type

11a Th. K+ red; Spores 22-25 x 6-7 µm

Roccella allorgei Abbayes.

11b Th. K- oder K+ yellow

Roccella arnoldii Vain.10b C -/red-; hyphae *Canariensis*-Type

12a Soralia C-;

Roccella tuberculata (Vain.) Tav.

12b Soralia C+ red

Roccella vicentina (Vain.) Follmann
(incl. ***Roccella boergesenii*** Vain.)

Sticta

1a Th. if wet green, without soralia. (A+,M+,C+)

Sticta canariensis (Bory) Bory ex Delise

1b Th. if wet grey, dark grey or somewhat brown, with isidia or soralia

2a Th. with grey to grey-bluish soralia. (A+,M+,C+)

Sticta limbata (Sm.) Ach.

2b Th. without soralia but with isidia

3a Isidia flat, branched, mainly at the margins; Th. at the margin strongly slitted. (A+,M+,C+)

Sticta dufourii Delise

3b Isidia round, cylindric or like minut corals; Th. coarse not fine insected

4a Isidia mostly at the margins. (A+,M-,C+)

Sticta weigeli (Ach.) Vain.

4b Isidia mostly on the lamina, species difficult to separate

5a Th. not reticulate, mat, one or few rounded, 1-3 cm wide lobes; cyphellae of unequal width.
(A+,M+,C+)

Sticta fuliginosa (Dicks.) Ach.

5b Th. reticulate, shiny if young, more lobes, lobes 0,5-1,5 cm wide; isidia on the ridges;
cyphellae small and mostly of equal width. (A-,M+,C+)

Sticta silvatica (Huds.) Ach.