
NORDIC LICHEN FLORA



Volume 2
Physciaceae

2002

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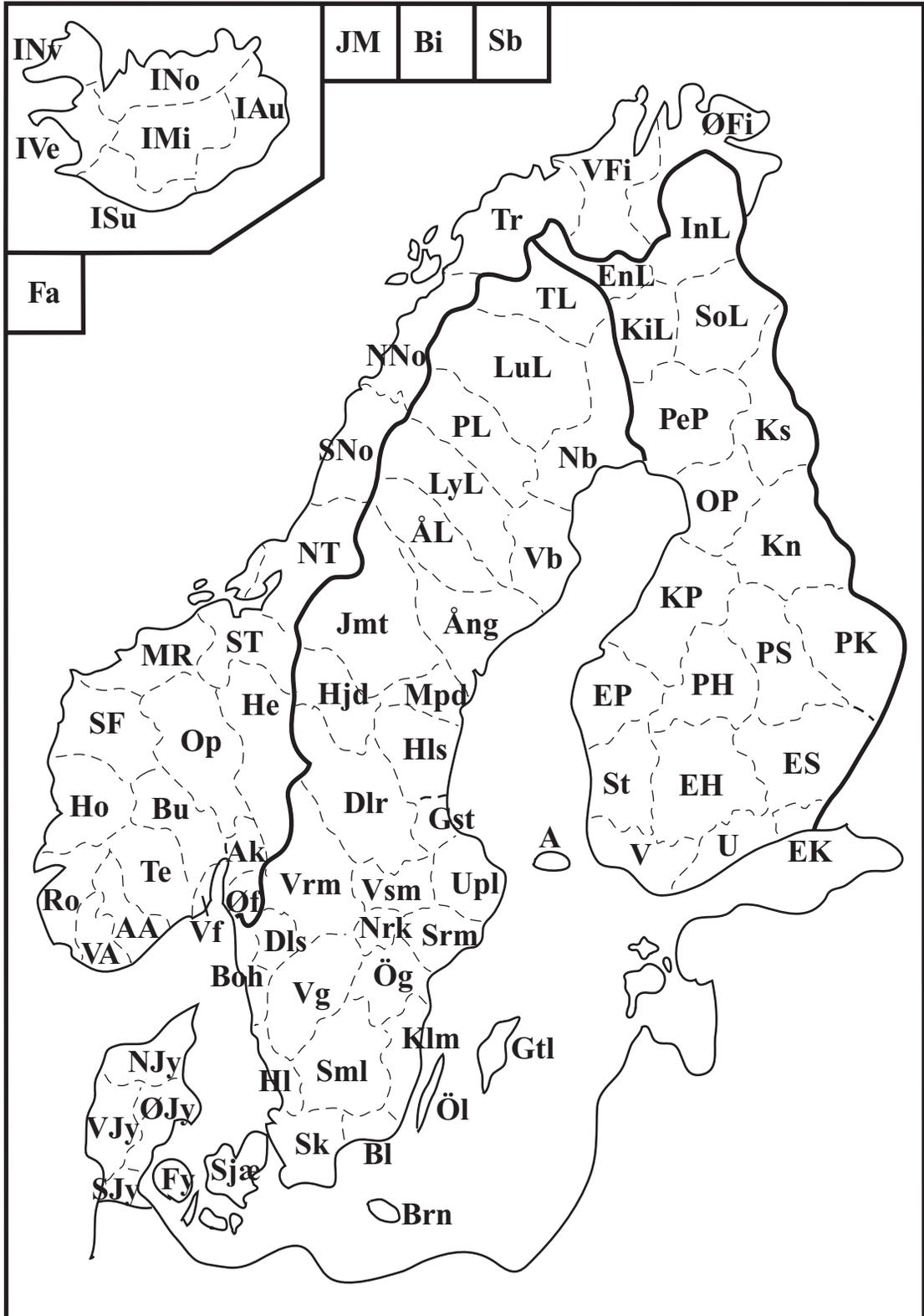
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Preface

The second volume of Nordic Lichen Flora is a teamwork between myself and some co-authors. Helmut Mayrhofer, Graz, has been involved in the genera *Amandinea*, *Phaeorrhiza* and *Rinodina*, Tony Foucard and Anders Nordin, Uppsala, in the genus *Buellia*. Various additions and comments have been given by the editorial board and by Brian Coppins, Edinburg and David Galloway, Dunedin, New Zealand. Gunnar Carlin, Uppsala has spent much time with me preparing the colour pictures and has been of invaluable help at the final stage. Our intention has been to make colour pictures of all treated species. With the exception of a few species and varieties we have been able to fulfil our intentions. Scientific names follow the same general statements as presented in Vol. 1, but a considerable amount of nomenclatural novelties are presented in the Appendix. Maps of all species (not varieties) are produced and an index to synonyms is also given.

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Uppsala in April 2002
Roland Moberg
Editor



Physciaceae

R. Moberg

Autonomous lichens or obligately, facultatively or temporarily parasitic or parasymbiotic on other lichens. THALLUS foliose, (fruticose), squamulose or crustose, pale yellowish, whitish grey to dark grey or brown. ASCOMATA apothecia, immersed to sessile or shortly stalked, crypto-lecanorine (immersed) or lecanorine to lecideine with \pm distinct exciple. Asci clavate, walls amyloid, tholus thick. Paraphyses simple or sparsely branched in uppermost part, tips brown. Spores brown, normally 8/ascus and 1-septate, sometimes pluriseptate, often with uneven thickenings. Spore surface smooth to more or less rugulate or striate. CONIDIOMATA mostly immersed, conidia ellipsoid or bacilliform to filiform. PHOTOBIONT *Trebouxia*.

Chemistry. Variable. The information given is mainly based on Nordic material.

Note. Characterized by the brown, septate spores.

Literature: Hafellner, Mayrhofer & Poelt, Beih. Nova Hedw. 79: 39–79 (1979); Rambold, Mayrhofer & Mattsson, Pl. Syst. Evol. 192: 31–40 (1997); Nordin, Symb. Bot. Ups. 32(1):195–208 (2000); Nordin & Mattsson, Lichenologist 33: 3–23 (2001); Scheidegger, Mayrhofer, Moberg & Tehler, Lichenologist 33: 25–45 (2001).

Key to genera

- 1 Thallus foliose or squamulose..... 2
 - Thallus crustose..... 8
- 2 Thallus squamulose..... *Phaeorrhiza*
 - Thallus foliose..... 3
- 3 Upper cortex prosoplectenchymatous..... *Heterodermia*
 - Upper cortex para- or scleroplectenchymatous..... 4
- 4 Conidia filiform, to 20 μ m long.
 - Very small thalli, to 1 cm..... *Hyperphyscia*
 - Conidia ellipsoid to bacilliform, less than 8 μ m long. Thallus larger, to 10 cm..... 5
- 5 Spores less than 28 μ m long, with distinct apical thickenings, upper cortex paraplectenchymatous, rhizinae simple..... 6
 - Spores more than 30 μ m long, thick-walled but without apical thickenings, upper cortex various, rhizinae squarrose or simple..... 7
- 6 Thallus K⁻ (without atranorin)..... *Phaeophyscia*
 - Thallus K⁺ yellow (atranorin)..... *Physcia*

- 7 Upper cortex prosoplectenchymatous..... *Anaptychia*
 - Upper cortex sclero- or paraplectenchymatous..... *Physconia*
- 8 Thallus placodioid (cfr. also *Buellia asterella*, *B. elegans* and *Rinodina balanina*)..... 9
 - Thallus not placodioid..... 10
- 9 Thallus yellowish or greenish, not pruinose. Rather common in northern mountains..... *Dimelaena*
 - Thallus greyish, strongly pruinose. Rare and southern..... *Diploicia*
- 10 Conidia filiform, to 30 μ m long..... *Amandinea*
 - Conidia bacilliform..... 11
- 11 Apothecia usually lecanorine, when lecideine spores with apical wall thickenings at least at young stages..... *Rinodina*
 - Apothecia immersed to lecideine, spores without apical wall thickenings..... *Buellia*

Amandinea

H. Mayrhofer & R. Moberg

Amandinea M. Choisy ex Scheid. & H. Mayrhofer

in Scheidegger, Lichenologist 25: 341 (1993). – TYPE: *Amandinea coniois* (Wahlenb.) M. Choisy ex Scheid. & H. Mayrhofer

Literature: Scheidegger, Beitr. Revision gesteinsbewohn. Sippen *Buellia* N.-Eur. Bern diss. (1988); Scheidegger, Lichenologist 25: 341–343 (1993); Marbach, Biblioth. Lichenol. 74: 52–53 (2000).

THALLUS crustose, granulose, rimose, areolate to continuous and rimose, sometimes bullate. Medulla not amyloid (I⁻). APOTHECIA lecanorine or biatorine to lecideine, immersed to sessile, base broad or constricted. Exciple of radiating hyphae, \pm pigmented in outer part. Hymenium without oil droplets. Epihymenium brown. Hypothecium colourless to brown. Asci *Bacidia*-type, 8-spored. Spores *Buellia*-type (without wall thickenings, Fig. 1) brown, 1-septate, or sometimes *Physconia*-type (with median wall thickenings, Fig. 1). CONIDIOMATA immersed, conidia filiform, to 30 μ m long. PHOTOBIONT *Trebouxia*.

Chemistry. No secondary substances (by TLC) in Nordic material.

Note. Characterized by the crustose thallus, 1-septate, brown spores, and filiform conidia to 30 μ m long.

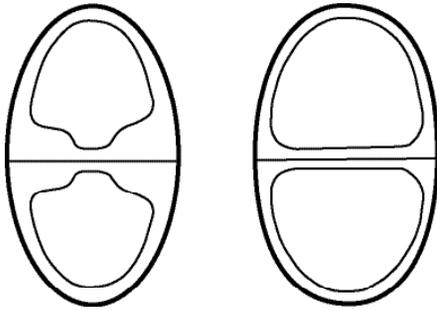


Fig. 1. Spore-types: *Physconia*-type (left), *Buellia*-type (right).

- | | | |
|---|---|------------------------|
| 1 | Apothecia lecanorine..... | 1. <i>A. cacuminum</i> |
| – | Apothecia lecideine..... | 2 |
| 2 | Thallus areolate to bullate, less than 0.5 mm thick, brownish. Spores rugulate. Maritime..... | 2. <i>A. coniops</i> |
| – | Thallus granular to rimose, to 0.3 mm thick, whitish to grey. Spores smooth to finely rugulate. ± maritime..... | 3 |
| 3 | Spores <i>Physconia</i> -type, finely rugulate..... | 3. <i>A. lecideina</i> |
| – | Spores <i>Buellia</i> -type, smooth to finely rugulate..... | 4. <i>A. punctata</i> |

1. *Amandinea cacuminum* (Th.Fr.) H. Mayrhofer & Sheard

Mycotaxon 82: 438 (2002). – *Rinodina sophodes* β *milvina* f. *cacuminum* Th.Fr., Lich. Scand.: 201 (1871). – TYPE: Norway, Dovre, Harbakken, 1863 Th. M. Fries (UPS lectotype, Mayrhofer & Poelt, Biblioth. Lichenol. 12: 70, 1979).

Syn. *Rinodina cacuminum* (Th.Fr.) Malme, *R. milvina* var. *subdeflectens* (Vain.) Zahlbr.

F: lintunappijäkälä

Literature: Mayrhofer & Poelt, Biblioth. Lichenol. 12: 70–71 (1979); Mayrhofer, J. Hattori Bot. Lab. 55: 387 (1984); Moberg & Mayrhofer, Taxon 47: 455 (1998); Mayrhofer & Sheard, Mycotaxon 82: 438 (2002).

THALLUS evanescent, granulose to verrucose, mostly covered with apothecia, grey brown to dark brown. Prothallus absent or present, brown to black. APOTHECIA lecanorine, 0.3–0.6 mm diam., abundant, crowded, often contiguous, constricted at base to broadly attached, margin prominent, sometimes crenulate. Hymenium 60–80 μm tall. Epithymenium dark brown. Hypothecium to 80 μm high, colourless or brown in older ascomata. Spores *Buellia*-type (= *Beltramia*-type), subcylindrical, some-times slightly curved, 12–17 × 6–8 μm. CONIDIOMATA rare, conidia 15–20 μm.

Chemistry. No secondary substances (by TLC) in Nordic material.

Habitat. Saxicolous, on exposed siliceous rocks often manured by birds close to the seashore but also more rarely in similar inland situations.

Distribution. Widely distributed along the coast in Finland, central and northern Sweden and Norway, also in Svalbard and Greenland. **Gr F**: A V U EK St EH EP OP PeP Ks EnL InL. **N**: He Op Bu Ho MR ST NT NNo Tr VFi ØFi. **AI**: Sb. **S**: HI Vg Nrk Srm Vrm Vsm Upl Hls Hrj Jmt Vb LyL LL TL. Also known from Kola, Karelia, Novaya Zemlja, Siberia and North America.

Note. Characterized by its brown thallus mostly covered with apothecia and its spores lacking wall thickenings. This species is transferred to the genus *Amandinea* based on the long filiform conidia and additional characters from molecular data.

2. *Amandinea coniops* (Wahlenb.) M. Choisy ex Scheid. & H. Mayrhofer

in Scheidegger, Lichenologist 25: 342 (1993). – *Lecidea coniops* Wahlenb. in Ach., Methodus Lichenum, Suppl.: 8 (1803). – TYPE: Norway, Finmark, Altenfjord, Bosekop, IV.1802 G. Wahlenberg (UPS holotype)

Syn. *Buellia coniops* (Wahlenb.) Th.Fr.

D: fuglefjelds-sortskivelav F: merinyppijäkälä

Literature: Scheidegger, Lichenologist 25: 342 (1993).

THALLUS areolate to bullate, brown, –0.5 mm thick. APOTHECIA biatorine to lecideine, to 1 mm diam., broadly sessile, margin thick and persistent. Hymenium to 60–80 μm high. Hypothecium dark brown. Spores *Physconia*-type, rugulate, broadly oblong, constricted at septum, 13–18 × 7–9.5 μm. CONIDIOMATA ± common, conidia 15–30 μm.

Chemistry. No secondary substances (by TLC) in Nordic material.

Habitat. Saxicolous, on granitic or basaltic seashore rocks in boreal or arctic areas.

Distribution. **Gr F**: A V U St EP OP PeP. **I**: I Ve I Au INv INo. **N**: Ho SF MR ST NT SNo NNo Tr VFi ØFi. **AI**: JM Bi Sb. **S**: Bh Srm Upl Hls Mpd Ång. Otherwise known from coastal British Isles, Siberia, Alaska, Canada and Antarctica.

Note. Characterized by the thallus thickness, apothecia size and spore size.

3. *Amandinea lecideina* (H. Mayrhofer & Poelt)
Scheid. & H. Mayrhofer

in Scheidegger, *Lichenologist* 25: 342 (1993). – *Rinodina lecideina* H. Mayrhofer & Poelt, *Biblioth. Lichenol.* 12: 112 (1979). – TYPE: Ireland, Ciarrai/Kerry Co. Corca Dhuibhane/Dingle-peninsula, Umgebung des Weilers Balloughteragh N Baile an Fheirtearaigh/Ballyferrier, an Weidemaern, VIII.1978 Poelt (GZU holotype).

Syn. *Rinodina lecideina* H. Mayrhofer & Poelt, *R. biatorina* Körb. var. *buellioides* Berg

Literature: Scheidegger, *Lichenologist* 25: 342 (1993).

THALLUS rimose, whitish to brownish. APOTHECIA lecideine, to 0.6 mm diam., broadly sessile, margin thin and persistent. Hymenium 70–90 µm tall. Hypothecium brown. Spores *Physconia*-type (see Fig. 1 above), finely rugulate, not constricted at septum, 10–15 × 6.5–8.5 µm. CONIDIOMATA common, conidia to 30 µm.

Chemistry. No secondary substances (by TLC) in Nordic material.

Habitat. Saxicolous, on siliceous rocks mostly near the sea.

Distribution. **F:** Ks EnL. **I:** IVe IAU INv INo. **N:** Ak. **S:** Sk ÖI Gtl Upl. Otherwise known from Mediterranean and Western Europe, North Africa and Australasia.

Note. Characterized by the *Physconia*-type spores and ± abundant conidiomata. The cited specimens from northern Norway in Mayrhofer (1984) probably refer to badly developed *Amandinea coniops*.

4. *Amandinea punctata* (Hoffm.) Coppins & Scheid.

in Scheidegger, *Lichenologist* 25: 343 (1993). – *Verrucaria punctata* Hoffm., *Deutschlands Flora*: 192 (1796). – TYPE: [Germany] In cortice, ligno, saxis. (not designated).

Syn. *Buellia punctata* (Hoffm.) A. Massal., *B. punctiformis* (Hoffm.) A. Massal., *B. myriocarpa* (DC.) De Not., *B. stigmatea* Körb.

F: pistenyppyjäkälä **S:** liten skivlav

Literature: Scheidegger, *Lichenologist* 25: 343 (1993).

THALLUS rimose, very thin, greyish. APOTHECIA lecideine, to 0.6 mm diam., broadly sessile or slightly constricted at

base, margin thin, persistent. Hymenium 70 µm tall. Hypothecium brown. Spores *Buellia*-type, smooth to finely rugulate, oblong, ± constricted at septum, 12–15 × 6–8 µm. CONIDIOMATA rare, conidia to 20 µm.

Chemistry. No secondary substances (by TLC) in Nordic material.

Habitat. Corticolous, lignicolous, muscicolous, and saxicolous on siliceous rocks.

Distribution. Often very common. **D:** NJy ØJy VJy SJy Fyn Sjæ Brn. **Gr Fa F:** A V U EK St EH ES LK EP PH PS PK KP Kn OP PeP Ks KiL EnL InL. **I:** IVe IMI IAU INv INo. **N:** Ak He Op Bu AA Ro Ho SF MR ST NT SNo NNv VFi ØFi. **Al:** Sb. **S:** Sk Bl ÖI Gtl Klm SmI HI Bh Dls Vg Ög Nrk Srm Vrm Vsm Upl Dlr Gst Hls Mpd Ång Hlj Jmt Vb ÅsL LyL LL TL. Otherwise known from the rest of Europe and have also been reported from other continents.

Note. Characterized by the *Buellia*-type spores and the relatively short conidia. Saxicolous and muscicolous material usually placed under this name is much in need of taxonomic revision.

Anaptychia

R. Moberg

Anaptychia Körb.

Grundr. Krypt.-Kunde: 197 (1848). – Type: *Anaptychia ciliaris* (L.) Körb.

D: frynselavar **F:** tripsijäkälät **I:** renglur **N:** mattlav **S:** allélavar

Literature: Kurokawa, *Beih. Nova Hedwigia* 6: 9 (1962); J. Hattori *Bot. Lab.* 37: 563–607 (1973); Poelt, *Nova Hedwigia* 9: 31 (1965).

THALLUS foliose to subfruticose, lobate with discrete or weakly overlapping lobes, upper cortex prosoplectenchymatous, lower cortex absent or when present prosoplectenchymatous. APOTHECIA lecanorine, laminal, sessile or stipitate, with brown to black disc. Asci cylindrical, 8-spored, with brown, 1-septate spores *Physconia*-type, usually over 30 µm long. CONIDIOMATA immersed except for the dark ostiole, conidia subcylindrical, 5–6 × 1 µm. PHOTOBIONT *Trebouxia*.

Chemistry. No secondary substances (by TLC) in Nordic material.

Note. Characterized by brown, 1-septate, large spores *Physconia*-type, and prosoplectenchymatous upper cortex.

- 1 With long marginal cilia, grey to brownish.....1. *A. ciliaris*
– Without marginal cilia, brown..... 2. *A. runcinata*

1. *Anaptychia ciliaris* (L.) Korb.

in A. Massal., Mem. Lichenogr.: 35 (1853). – *Lichen ciliaris* L., Sp. Pl.: 1144 (1753). – TYPE: Sine loc. (LINN 1273.92 lectotype, Jørgensen et al., Bot. J. Linn. Soc. 115: 292, 1994).

Syn. *Anaptychia ciliaris* var. *melanosticta* (Ach.) Boistel., *A. ciliaris* ssp. *mamillata* (Taylor) D. Hawksw. & P. James, *A. mamillata* (Taylor) Trass, nom. inval.

D: allé-frynselav **F:** puistoripsijäkälä **I:** klórengla **N:** allélav **S:** allélav (inkl. strandallélav)

Literature: Kurokawa, Beih. Nova Hedwigia 6: 11–14 (1962); Hakulinen, Arch. Soc. Zool. Bot. Fenn. Vanamo 17: 121 (1962).

Figs: Moberg & Holmåsén 1990: 193; Wirth 1995: 122.

THALLUS to 10 cm diam., usually joining with other thalli forming large patches (to 30 cm), loosely attached, pale to dark grey (almost black on exposed seashores) without pruina but with hairs on the surface. Lobes long, narrow (to 3 mm) and distinctly separate forming an irregular pattern, margins with long, dark grey to black, hairy cilia. Underside white. Upper cortex with hyphae ending as protruding hairs; lower cortex absent. APOTHECIA ± common, stalked, often with marginal lobules, to 8 mm diam. Spores (32–)34–41(–43) × (16–)17–21(–22) µm. CONIDIOMATA common, conidia as for the genus.

Chemistry. No secondary substances (by TLC) in Nordic material.

Habitat. Corticolous, on deciduous, mainly solitary trees in open situations in parks and courtyards, but also in higher forests. Occasionally on concrete walls and rock outcrops. The morphotype on seashore rocks (var. *melanosticta*) grows in open situations, often exposed, halophilous and ornithocrophilous.

Distribution. Widely distributed in the southern parts of the area becoming rare or absent in the north. Also along the seashores. **D:** NJy ØJy VJy SJy Fyn Sjæ Brn. **F:** A V U EK St EH ES LK EP PH PS PK KP Kn OP PeP Ks. **I:** ISu IVe IAu INv INo. **N:** Øf Ak He Op Bu Vf AA Ro Ho SF MR ST NT SNo NNo Tr VFi ØFi. **S:** Sk Bl Öl Gtl Klm SmI Hl Bh Dls Vg Ög Nrk Srm Vrm Vsm Upl Dlr Gst

Hls Mpd Ång Jmt Nb. Otherwise known from the rest of Europe, North Africa and Near East.

Note. Characterized by the long and narrow lobes, hairy upper side, cilia with hairs and the large ascospores. The morphotype on seashore rocks is darker in colour and was recognized as var. *melanosticta*, but appears only an extreme growth form.

2. *Anaptychia runcinata* (With.) J.R. Laundon

Lichenologist 16: 225 (1984). – *Lichen runcinatus* With., Bot. Arr. Veg. Great Britain 2: 712 (1776). – TYPE: Icon in Dillenius, Historia Muscorum: 133, tab. 18, Fig. 14 (1742), holotype; without locality, corresponding specimen in herb. Dillenius (OXF epitype, Moberg, Nordic Lichen Flora 2: 70, 2002).

Syn. *Anaptychia fusca* Vain., *A. aquila* (Ach.) A. Massal. [based on *Lichen fusca* Huds., nom illeg., see Laundon, Lichenologist 16: 225, 1984].

D: brun frynselav **F:** meriripsijäkälä **I:** brúnrengla **N:** svaberglav **S:** brun franslav

Literature: Hakulinen, Arch. Soc. Zool. Bot. Fenn. Vanamo 17: 124 (1962).

Figs: Moberg & Holmåsén 1990: 193.

THALLUS usually orbicular, to 10 cm diam., firmly attached, brown to dark brown without pruina. Lobes radiating, to 3 mm broad, usually overlapping, without cilia. APOTHECIA abundant, covering central parts of the thallus, to 5 mm diam. Spores (31–)34–45(–54) × (17–)18–23(–27) µm. CONIDIOMATA common, conidia as for the genus.

Chemistry. No secondary substances (by TLC) in Nordic material.

Habitat. Saxicolous, on seashore rocks in open situations, often exposed, rarely inland rocks or tree trunks.

Distribution. More or less common along the coast in Denmark, eastern coast of Iceland, Norway and southern Finland and Sweden. **D:** NJy Fyn Sjæ Brn. **Fa F:** A V U KP. **I:** IVe IAu INv INo. **N:** Øf Ak Bu Vf Te AA VA Ro Ho SF MR ST NT SNo NNo Tr VFi ØFi. **S:** Sk Bl Öl Klm Hl Bh Dls Vg Ög Srm Upl. Otherwise known from coastal regions of Europe, North Africa.

Note. Characterized by the brown thallus without pruina, the abundant apothecia with two-celled, brown spores, the pale lower side, and the seashore *Habitat*. Resembles *Physconia*.

Buellia

T. Foucard, R. Moberg & A. Nordin

Buellia De Not., *nom. cons.*

Giorn. Bot. Ital. 2: 195 (1846). – TYPE: *Buellia disciformis* (Fr.) Mudd, *typ. cons.*

Syn. *Diplotomma* Körb., *Hafellia* Kalb, H. Mayrhofer & Scheidegger

Literature: Scheidegger, *Nova Hedwigia*, 47: 433–468 (1988); *Lichenologist* 25: 315–364 (1993); Nordin, *Symb. Bot. Ups.* 31(3): 327–354 (1996); *Symb. Bot. Ups.* 33(1): 1–117 (2000); *Internat. Code of Bot. Nomenclature* (Saint Louis Code), App. IIIA: 178 (2000); Trinkaus & Mayrhofer, *Nova Hedw.* 71: 271–314 (2000).

Autonomous lichens or obligately, facultatively or temporarily parasitic or parasymbiotic on other lichens. THALLUS evanescent to crustose, continuous to areolate or squamulose, margin sometimes placodioid; areolae flat to bullate, surface smooth to verrucose or granulose, whitish, greyish to brown or sometimes yellowish. Medulla amyloid or not. Prothallus often present, dark, sometimes fimbriate. APOTHECIA immersed to sessile with constricted base, lecidine, cryptolecanorine (immersed) or pseudolecanorine (with a spurious thalline rim), usually to 0.5 mm diam., in some species to 1.5 mm. Disc black or dark brown, in a few species sometimes with white or yellowish pruina. Thalline exciple lacking but a spurious thalline rim sometimes present. True exciple thin and poorly pigmented to well developed and dark-pigmented. Hymenium colourless, upper part sometimes greenish, with or without oil droplets. Epihymenium brown to green. Hypothecium colourless to dark brown. Paraphyses 1–2 μm , simple or branched in upper part, with swollen apices (to 5 μm), often with a brown cap. Asci clavate, with (4–)8(–16) spores, *Bacidia-*

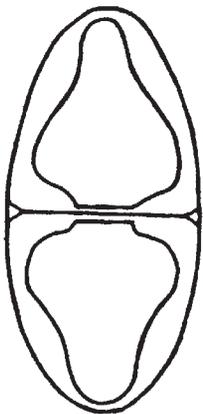


Fig. 2. *Callispora*-type.

or *Biatora*-type. Spores brown, ellipsoid to broadly oblong, mostly 1-septate, in a few species 3-septate to submuriform, without wall thickenings (*Buellia*-type, Fig. 1), or in a few species with median or subapical thickenings at young stages (*Physconia*-type and *Callispora*-type respectively, Figs. 1 & 2). Spore surface smooth to more or less rugulate or striate. CONIDIOMATA immersed, at least in upper part with dark brown wall; conidia bacilliform to narrowly ellipsoid, mostly 5–10 μm long. PHOTOBIONT *Trebouxia*.

Chemistry. 2'-O-methylperlatolic acid, 6-O-methylarthro-thelin, arthothelin, atranorin, barbatic acid, confluent acid, connorstictic acid, gyrophoric acid, menegazziaic acid, miriquidic acid, norstictic acid, placodiolic acid, stictic acid, trichlor-O-methylnorlichexanthone.

Note. Characterized by the crustose, sometimes invisible thallus, black, mostly lecidine apothecia, and brown, 1-septate to submuriform spores.

- | | | |
|----|---|----------------------------|
| 1 | Growing on other lichens | 2 |
| – | Not growing on other lichens | 9 |
| 2 | Spores 1-septate | 3 |
| – | Spores 3-septate or submuriform | 6 |
| 3 | Thallus invisible. On <i>Lecanora straminea</i> | 1. <i>B. adjuncta</i> |
| – | Thallus clearly visible. On other lichens | 4 |
| 4 | Thallus brown, medulla not amyloid. On various lichens ... | 7. <i>B. badia</i> |
| – | Thallus grey, medulla amyloid. On <i>Schaereria fusco-</i>
<i>cinerea</i> | 5 |
| 5 | Thallus C+ red. Spores striate, 8–11.5 \times 4.5–6.5 μm | 32. <i>B. uberior</i> |
| – | Thallus C–. Spores smooth, 6–8 \times 3.5–5 μm | 22. <i>B. miriquidica</i> |
| 6 | Spores submuriform | 3. <i>B. alboatra</i> |
| – | Spores 3-septate | 7 |
| 7 | Thallus invisible. On <i>Physconia muscigena</i> and <i>Physcia</i>
spp | 26. <i>B. pulverulenta</i> |
| – | Thallus white to greyish. On various lichens | 8 |
| 8 | Spores 24–38 \times 6–13 μm . Usually on terricolous lichens ... | 17. <i>B. geophila</i> |
| – | Spores 14–24 \times 6–9 μm .
On saxicolous <i>Lecanora</i> spp. | 33. <i>B. venusta</i> |
| 9 | Saxicolous | 10 |
| – | Corticulous, lignicolous, muscicolous or terricolous | 29 |
| 10 | Spores 3-septate to submuriform | 11 |
| – | Spores 1-septate | 13 |
| 11 | Spores submuriform. Apothecia immersed to subsessile.
On siliceous seashore rocks and calciferous substrates | 3. <i>B. alboatra</i> |
| – | Spores 3-septate. On calciferous rocks and mortar | 12 |

- 12 Thallus thick, smooth to rimose. Apothecia to 1.2 mm, long remaining immersed. Spores $14\text{--}24 \times 6\text{--}9 \mu\text{m}$ 33. *B. venusta*
 – Thallus moderately thick with areolae scattered or in groups. Apothecia to 0.5 mm, immersed to sessile. Spores $12\text{--}18 \times 5\text{--}8 \mu\text{m}$ 29. *B. subdispersa*
- 13 Thallus K+ red, norstictic acid. Apothecia immersed 14
 – Thallus K+ yellow or K–. Apothecia immersed to sessile .. 15
- 14 Areolae scattered 13. *B. ectolechioides*
 – Areolae not scattered 2. *B. aethalea*
15. Thallus C+ orange, UV+ orange 16
 – Thallus C–, UV– 18
- 16 Apothecia –1 mm, sessile, margin prominent 10. *B. concinna*
 – Apothecia –0.6 mm, immersed to subsessile, margin thin 17
- 17 Conidia 6–9 μm . Thallus slightly placodioid. Alpine species 20. *B. jugorum*
 – Conidia 4.5–5.5 μm . Thallus not placodioid. Lowland species 23. *B. ocellata*
- 18 Thallus \pm placodioid, white. Spores 4/ascus .. 6. *B. asterella*
 – Thallus not placodioid. Spores 8/ascus 19
- 19 Medulla amyloid 20
 – Medulla not amyloid 23
- 20 Exciple K+ orange-red 21. *B. leptocline*
 – Exciple not K+ orange-red 21
- 21 Thallus thin or inconspicuous. Spores $12\text{--}15 \times 7.5\text{--}9 \mu\text{m}$... 34. *B. vilis*
 – Thallus areolate. Spores smaller 22
- 22 Thallus C+ red. Spores striate, $8\text{--}11.5 \times 4.5\text{--}6.5 \mu\text{m}$ 32. *B. uberior*
 – Thallus C–. Spores smooth, $6\text{--}8 \times 3.5\text{--}5 \mu\text{m}$ 22. *B. miriquidica*
23. Apothecia immersed, –0.5 mm. Thallus white..... 24
 – Apothecia sessile. Thallus brown or white..... 25
24. Thallus K+ yellow. Apothecia –0.3 mm, epihymenium green. Spores 10–13 μm 28. *B. stellulata*
 – Thallus K–. Apothecia –0.5 mm. Epihymenium brown. Spores 9–11 μm 30. *B. tesserata*
- 25 Thallus K+ yellow, bullate to verrucose, white..... 25. *B. papillata*
 – Thallus K–, brown to grey 26
- 26 Thallus squamulose, brown. Conidia –5 μm 7. *B. badia*
 – Thallus not squamulose, brown to grey. Conidia 15–30 μm 27
- 27 Thallus areolate to bullate, brown, often thick. Apothecia –1 mm. Spores 13–18 μm long, rugulate. Mainly on seashore rocks *Amandinea coniops*
 – Thallus granular to rimose, greyish, often thin. Apothecia and spores smaller 28
- 28 Spores with median wall thickening, rugulate *Amandinea lecideina*
 – Spores without median wall thickening, smooth to finely rugulate..... *Amandinea punctata*
- 29 Corticolous or lignicolous 30
 – Terricolous or muscicolous 45
- 30 Thallus with soralia 31
 – Thallus without soralia 33
- 31 Soralia \pm confluent, dark brownish with a violet tinge 35. *B. violaceofusca*
 – Soralia \pm well-delimited, orbicular, colour otherwise 32
- 32 Soralia greyish-greenish-yellowish, K+ reddish, spores submuriform 18. *B. griseovirens*
 – Soralia mostly darker, bluish-brownish, K+ yellow. Spores 1-septate 4. *B. arborea*
- 33 Spores 3-septate or submuriform 34
 – Spores 1-septate 37
- 34 Spores submuriform 35
 – Spores 3-septate 36
- 35 Apothecia with thick rim. Spores with longitudinal septa on each side of middle septum, to 6-celled 25. *B. pharcidia*
 – Apothecia with thin rim. Spores with longitudinal septa also in apical part, usually 8-celled 3. *B. alboatra*
- 36 Thallus whitish, C–. Apothecia with thalline rim. Spores often with longitudinal septa 25. *B. pharcidia*
 – Thallus yellowish, C+ orange. Apothecia without thalline rim. Spores lacking longitudinal septa 31. *B. triphragmioides*
- 37 Spores 12–16/ascus 12. *B. dives*
 – Spores 8/ascus 38
- 38 Thallus C+ yellow-orange 39
 – Thallus C– 40
- 39 Apothecia to 0.8 mm. Spores $14.5\text{--}23.5 \times 5.5\text{--}11.5 \mu\text{m}$... 9 *B. chloroleuca*
 – Apothecia to 1.5 mm. Spores $23\text{--}32 \times 9\text{--}13 \mu\text{m}$ 19. *B. insignis*
- 40 Hymenium with oil droplets 41
 – Hymenium without oil droplets 42
- 41 Hymenium 100–150 μm tall. Spores to 15 μm thick, thickwalled. Conidia to 3.5 μm long 5. *B. arnoldii*
 – Hymenium to 120 μm tall. Spores to 11 μm thick, thinwalled. Conidia 5.5–7.5 μm long 11. *B. disciformis*
- 42 Thallus usually K+ red 16. *B. erubescens*
 – Thallus K– 43
- 43 Spores $23\text{--}32 \times 9\text{--}13 \mu\text{m}$ 19. *B. insignis*

- Spores less than $17 \times 8 \mu\text{m}$ 44
- 44 Spores $7\text{--}11 \times 3\text{--}4 \mu\text{m}$, pale brown 27. *B. schaereri*
- Spores $12\text{--}15 \times 6\text{--}8 \mu\text{m}$, brown *Amandinea punctata*
- 45 Thallus distinctly lobate 46
- Thallus not lobate 47
- 46 Spores 4/ascus 6. *B. asterella*
- Spores 8/ascus 14. *B. elegans*
- 47 Spores 3-septate, $24\text{--}38 \times 6\text{--}13 \mu\text{m}$ 17. *B. geophila*
- Spores 1-septate, smaller 48
- 48 Apothecia with \pm persistent thalline rim. Hymenium greenish 8. *B. chionea*
- Apothecia without thalline rim. Hymenium not greenish 49
- 49 Thallus K+ yellow, \pm bullate, white 24. *B. papillata*
- Thallus K- 50
- 50 Thallus granulate to verrucose, C+ yellow, UV \pm orange 19. *B. insignis*
- Thallus areolate to bullate, C-, UV- 15. *B. epigaea*

1. *Buellia adjuncta* Th.Fr.

Bot. Notiser 1866: 14 (1866). – TYPE: Norway, Finnmark, Vardø, 1864 Th. Fries (UPS lectotype, Hafellner, Beih. Nova Hedwigia 62: 50, 1979).

Syn. *Karschia adjuncta* (Th.Fr.) Arnold

Literature: Hafellner, Beih. Nova Hedwigia 62: 50 (1979).

Parasymbiont on *Lecanora straminea*. THALLUS not visible. APOTHECIA sessile, 0.2–0.5 mm diam., exciple dark brown. Hymenium without oil droplets. Epihymenium brown. Hypothecium dark brown. Spores *Buellia*-type, 1-septate, slightly constricted at septum, $14\text{--}18 \times 7.5\text{--}9 \mu\text{m}$. CONIDIOMATA not known.

Chemistry. No secondary substances (by TLC) in Nordic material.

Habitat. Lichenicolous, on *Lecanora straminea* in its northernmost range.

Distribution. **I**: INv **N**: Tr VFi ØFi. Otherwise known from the Aleutian Islands.

2. *Buellia aethalea* (Ach.) Th.Fr.

Lichenogr. Scand. 2: 604 (1874). – *Gyalecta aethalea* Ach., Lichenogr. Univ.: 669 (1810). – TYPE: England, "Anglia, Durham" (H-ACH 66 lectotype, Foucard, Moberg & Nordin, Nordic Lichen Flora 2: 70, 2002).

Syn. *Buellia aethaleoides* (Nyl.) H. Olivier, *B. baltica* Erichsen, *B. hillmannii* Erichsen, *B. sororia* Th.Fr., *B. sororioides* Erichsen.

D: klippe-sortskivelav **F**: kuopponyppyjäkäkä **S**: klippskivlav

Literature: Scheidegger, Lichenologist 25: 343 (1993).

THALLUS areolate, grey to brownish, to 1 cm diam. or more, medulla \pm amyloid. APOTHECIA immersed, to 0.5 mm diam., \pm immarginate, exciple inconspicuous, usually dark olivaceous. Hymenium without oil droplets. Epihymenium brown to green, N+ reddish. Hypothecium colourless to dark brown. Spores *Buellia*-type, slightly constricted at septum, rugulate, 1-septate, $13\text{--}18 \times 8\text{--}10.5 \mu\text{m}$. CONIDIOMATA \pm common, conidia bacilliform, $5.5\text{--}8.5 \mu\text{m}$.

Chemistry. Thallus K+ yellow turning red. Norstictic acid usually present, sometimes in low concentrations or rarely lacking, rarely stictic and menegazziaic acid.

Habitat. Saxicolous, on siliceous substrates, often an early colonizer, from coast to alpine zones.

Distribution. **D**: NJy ØJy Fyn Sjæ. **Gr Fa F**: V St PS. **I**: IMi INo. **N**: VA Ro Ho SF MR NT SNo ØFi. **S**: Sk Bl ÖI Gtl Klm Sml HI Bh Vg Ög Nrk Srm Vrm Vsm Upl Hls Hrj Jmt Vb LL TL. Otherwise known from the rest of Europe.

Note. Variable, but recognized by the siliceous habitat, C-, K+ red (usually), areolate thallus and immersed apothecia.

3. *Buellia alboatra* (Hoffm.) Th.Fr.

Genera heterolichenum Europaea recognita: 91 (1861). – *Lichen alboater* Hoffm., Enumeratio lichenum: 30 (1784). – TYPE: Germany, "Häufig an alten Linden längs der Strasse bei Schleissheim, München", 1889, Arnold, (Arnold, Lich. Mon. exs. 55, UPS neotype, Nordin, Symb. Bot. Ups. 31(3): 339, 1996).

Syn. *Buellia ambigua* (Ach.) Malme, *B. epipolia* (Ach.) Mong., *B. margaritacea* Lynge, *B. nivalis* (Bagl. & Carestia) Hertel, *B. vezdana* Scholz & Knoph, *Diplotomma alboatrum* (Hoffm.) Flot., *D. ambiguum* (Ach.) Flagey, *D. chlorophaeum* (Light.) Szatala (comb. inval.), *D. nivale* (Bagl. & Carestia) Hafellner.

D: sorthvid-sortskivelav **F**: härmänyppyjäkäkä **S**: vit-skivlav

Literature: Nordin, Symb. Bot. Ups. 31(3): 329 (1996).

Figs: Moberg & Holmäsén 1990: 194; Wirth 1995: 194.

THALLUS rimose to subsquamulose, white to greyish or

brownish, with calcium oxalate (deposit?) in cortex, orbicular to irregular, medulla rarely amyloid. APOTHECIA 0.2–1.5 mm diam., usually less than 0.5 mm, immersed to subsessile. Disc flat to usually \pm convex, often pruinose, margin often with thalline rim or granules, exciple distinctly pigmented only in outermost part, with rounded, rather thin-walled cells. Hymenium without oil droplets. Epithymenium brown. Hypothecium pale to dark brown. Spores submuriform (young spores 3-septate), rugulate, $13\text{--}20 \times 7\text{--}10 \mu\text{m}$. CONIDIOMATA rare, conidia $6\text{--}10 \times 1 \mu\text{m}$.

Chemistry. Thallus K⁻, P⁻, sometimes K⁺ yellow turning red, P⁺ yellow-orange, then with norstictic acid.

Habitat. Rough bark of deciduous trees, vertical phases of siliceous seashore rocks, calciferous substrates, rarely lignum. When young often parasitic on other lichens, e.g. *Caloplaca* and *Xanthoria*.

Distribution. **D:** NJy ØJy Fyn Sjæ Brn. **F:** A V U EH ES LK PK Kn Ks InL. **I:** ISu IVe IAU InO. **N:** Øf Ak He Op Bu AA Ro Ho SF ST NT SNo NNo Tr VFi ØFi. **S:** Sk Bl Öl Gtl Klm Sml Hl Bh Dls Vg Ög Nrk Srm Vrm Vsm Upl Dlr Hls Mpd Ång Hrj Jmt ÅsL LyL LL TL. The norstictic acid chemotype is known from S Sweden and SW Norway. Widely distributed in the Northern Hemisphere. Also known from South Africa and Australasia.

Note. Characterized by the submuriform spores and the small, immersed to subsessile, often pruinose apothecia, often surrounded by a thin thalline veil or having the rim partly covered with thalline granules. Very variable due to substrate, structure of host thallus and amount of calcium oxalate present in thallus and therefore often divided into several species.

4. *Buellia arborea* Coppins & Tønsberg

Sommerfeltia 14: 111 (1992). – TYPE: Scotland, Inverness-hire, Easternness (VC 96), Abernethy Forest, ENE of Forest Lodge, 1980 Coppins 4788 & Sherwood (E holotype).

Literature: Tønsberg, Sommerfeltia 14: 111 (1992); Foucard & Nordin, Graphis Scripta 10: 53 (1999).

Figs: Tønsberg, Sommerfeltia 14: 112 (1992).

THALLUS whitish but mostly endosubstratal, forming roundish, flat to concave, well delimited, to 0.4 cm, sorediate patches with blue-green to brownish, to 30 μm wide soredia. APOTHECIA rare, immersed to sessile, to 0.5 mm diam. Disc concave to flat, margin persistent, exciple of radiating hyphae, brown in outermost part, olivaceous in

inner part. Hymenium with oil droplets. Epithymenium olivaceous. Hypothecium brown to olivaceous. Spores *Callispora*-type, smooth, 1-septate, $19\text{--}25 \times 8.5\text{--}10 \mu\text{m}$. CONIDIOMATA not seen.

Chemistry. K⁺ yellow. Atranorin, placodiolic acid.

Habitat. Lignicolous, rarely corticolous, in open forests.

Distribution. **F:** PS. **N:** He Op Bu AA Ro SF ST. **S:** Öl Gtl Bh Ög Nrk Srm Vrm Vsm Upl Dlr Gst Hls Mpd Hrj Jmt Nb LyL PL LL TL. Otherwise known from England, Scotland and the Alps.

Note. Characterized by the well delimited soralia on an indistinct thallus becoming K⁺ yellow. For reliable separation from *B. griseovirens* TLC may sometimes be necessary (placodiolic acid).

5. *Buellia arnoldii* Servit

in Servit & Nádvořník, Věstniku Král. ces. Spol. Nauk 2: 39 (1931). – TYPE: Germany, "Bayern, Schachen bei Garmisch, an Zirben-Ästen", VIII.1874 F. Arnold (M lectotype, Foucard, Moberg & Nordin, Nordic Lichen Flora 2: 70, 2002).

Literature: Røsbjerg, Graphis Scripta 2: 81–82 (1989); Fritz, Graphis Scripta 9: 43–44 (1998); Giral et al., Lichenologist 32: 121–123 (2000).

THALLUS irregular, whitish, smooth to rough, sometimes endophloeodal. APOTHECIA sessile, lecideine, 0.5–1 mm. Hymenium with oil droplets. Epithymenium brown to olive-brown. Hypothecium dark brown. Spores *Callispora*-type, smooth, 1-septate, often curved, $25\text{--}32 \times 9\text{--}15 \mu\text{m}$. CONIDIOMATA immersed, conidia oblong, $3\text{--}3.5 \times 1\text{--}1.5 \mu\text{m}$.

Chemistry. K⁺ yellow. Atranorin.

Habitat. Corticolous, growing on *Alnus*, *Betula*, *Fagus*, *Juniperus* or *Ilex*.

Distribution. Known only from a few localities in Fennoscandia. **N:** Ho. **S:** Hl Ög Vrm Upl Gst. Otherwise known from the Alps and NW Scotland.

Note. Rare species, similar to *B. disciformis* but spores are larger with thicker septum and walls, and conidia are shorter.

6. *Buellia asterella* Poelt & Sulzer

Nova Hedwigia 25: 182 (1974). – TYPE: Germany, "Auf steinigem

Boden der kahlen Berghöhen oberhalb Würgau bei Schesslitz in Oberfranken", 1860 Arnold, Lich. exs. no. 165. (M lectotype, Foucard, Moberg & Nordin, Nordic Lichen Flora 2: 70, 2002, as "holotype" by Poelt & Sulzer, Nova Hedwigia 25: 182, 1974).

Literature: Poelt & Sulzer, Nova Hedwigia 25: 182 (1974); Trinkaus & Mayrhofer, Nova Hedwigia 71: 279 (2000).

Figs: Poelt & Sulzer 1974:193; Trinkaus & Mayrhofer 2000:281.

THALLUS ± lobate, orbicular, white, 1–1.5 cm diam., medulla not amyloid. APOTHECIA 0.8–1.2 mm, sessile, when young often ± pruinose and with a thalline rim, exciple of radiating hyphae, brown, in inner part often paler. Hymenium without oil droplets. Epihymenium brown. Hypothecium brown. Spores usually 4/ascus, of *Buellia*-type, ± smooth, 1-septate, 10–17 × 5–8 µm. CONIDIOMATA not seen.

Chemistry. Cortex K+ yellow to red, P+ orange-red. Atranorin and norstictic acid, or K–, P–.

Habitat. Saxicolous, growing on calciferous rocks or calcareous soil in dry habitats.

Distribution. Known only from the area in Norway with continental climate. **N:** Op. Otherwise known from England, France, Germany and the Alps.

Note. Characterized by the white, ± lobate thallus and the 4-spored asci.

7. *Buellia badia* (Fr.) A. Massal.

Memor. Lichenogr. 1853: 124 (1853). – *Lecidea badia* Fr., Syst. Orbis Veget. 1: 287 (1825). – TYPE: Austria, Kärnten, "am Südbhang des Falkenbergs bei Klagenfurt", 1890 J. Steiner (Arnold, Lich. Exs. No 1505, UPS neotype, Foucard, Moberg & Nordin, Nordic Lichen Flora 2: 70, 2002)

Syn. *Buellia bayrhoferi* (Schaer.) H. Olivier, *B. duebenii* Fr. ex Hellb.

Redlisted in: **D:** Ex

Literature: Scheidegger, Lichenologist 25: 345 (1993).

Figs: Wirth 1987: 81; 1995:196.

THALLUS with ± irregular and closely growing, convex squamules, 0.5–1 mm long, more rarely areolate, brown, medulla not amyloid. APOTHECIA lecideine, to 0.8 mm, sessile. Hymenium without oil droplets. Epihymenium and hypothecium brown to dark brown. Spores *Buellia*-type, ± smooth, 1-septate, 10–15 × 6–8 µm. CONIDIOMATA uncommon, conidia bacilliform 4.5–5 µm.

Chemistry. No secondary substances (by TLC) in Nordic material.

Habitat. Saxicolous, often growing over various lichens such as *Melanelia* spp. and *Neofuscelia* spp.

Distribution. **F:** V U EH ES InL. **N:** Ak He Op ST Tr VFi. **S:** ÖI HI Bh Vg Nrk Srm Vrm Vsm Upl Ång Jmt. Otherwise known from most parts of the rest of Europe, North Africa, North America and New Zealand.

Note. Characterized by its ± squamulose, brown thallus and lichenicolous habit.

8. *Buellia chionea* (Th.Fr.) Sheard

Nordic Lichen Flora 2: 70 (2002). – *Rinodina chionea* Th. Fr., Lich. Scand. 1: 206 (1871). – TYPE: Norway, Dovre, Varstien, 1863 Th. Fries (UPS lectotype, Sheard in Foucard, Moberg & Nordin, Nordic Lichen Flora 2: 70 (2002).

Literature: Th.M. Fries, Lichenographia Scandinavica 1 (1871).

THALLUS granular to verrucose, white to greyish, irregular, to 2 cm, thin, medulla not amyloid. APOTHECIA to 0.5–1 mm, immersed to sessile, as young with a thalline margin. Hymenium greenish without oil droplets. Epihymenium dark green-brown, N+ reddish. Hypothecium dark brown. Spores *Buellia*-type, 1-septate, 13–18 × 6–9 µm. CONIDIOMATA not seen.

Chemistry. No secondary substances (by TLC) in Nordic material.

Habitat. Muscicolous in alpine regions.

Distribution. **Gr I:** ISu IVE IMi IAu. **N:** ØFi. **S:** Hrj Jmt. Not known from other areas.

Note. Characterized by the habitat, the thalline margin of young apothecia, and the greenish hymenium.

9. *Buellia chloroleuca* Körb.

Parerga Lichenologica: 191 (1860). – TYPE: Poland, Slask "Sudetén", Körper (UPS lectotype, A. Nordin in Foucard, Moberg & Nordin, Nordic Lichen Flora 2: 70, 2002).

Syn. *Buellia zahlbruckneri* s. auct. non J. Steiner

Literature: Nordin, Graphis Scripta 11: 35–39 (2000); Giralt, Barbero & Elix, Lichenologist 32: 109 (2000).

THALLUS rimose to verrucose or granulose, thin, whitish to greenish grey, sometimes slightly ochraceous, medulla not amyloid. APOTHECIA lecideine, soon sessile, 0.2–0.8 mm, ± crowded, margin soon disappearing. Hymenium without oil droplets. Epithymenium brown. Hypothecium brown. Spores *Buellia*-type, but sometimes slightly subapically thickened when young, rugulate, 1-septate, (14.5–)17–20.5(–23.5) × (5.5–)7–9(–11.5) µm. CONIDIOMATA not seen.

Chemistry. C+ yellow to orange, UV+ orange. 6-O-methylarthothelin.

Habitat. Corticolous, on bark of various trees with smooth bark and *Juniperus* in subalpine areas or at lower altitude in northern parts of Scandinavia.

Distribution. Few records but widely distributed. **F:** PeP. **I:** IMi IAU INo. **N:** Op AANT NNo Tr. **S:** Hrj Jmt. Otherwise known from Central and South Europe.

Note. The species is closely related to *B. insignis* but the latter has larger apothecia, larger spores and mainly tercolous growth. *B. chloroleuca* was incorrectly treated as *Buellia zahlbruckneri* as pointed out by Nordin (l.c.).

10. *Buellia concinna* Th.Fr.

Nova Acta Reg. Soc. Scient. Upsal., ser. 3, 3: 232 (1860, sep. print). – TYPE: Norway, Finmark, Varanger, Nesseby, 1857 Th. M. Fries (UPS lectotype, Foucard, Moberg & Nordin, Nordic Lichen Flora 2: 70, 2002, as "holotype" by Scheidegger Nova Hedwigia, 47: 452, 1988).

Syn. *Buellia nodulosa* (Lyng.) H. Magn., *B. subconcinna* (Vain.) Zahlbr.

Literature: Scheidegger, Nova Hedwigia, 47: 452–454 (1988); Lichenologist 25: 347 (1993).

THALLUS areolate, often dispersed, yellowish, medulla ± amyloid. APOTHECIA to 1 mm diam., sessile, constricted, margin prominent, to 0.1 mm thick, exciple of radiating hyphae, dark throughout in old apothecia. Hymenium without oil droplets. Epithymenium brown. Hypothecium dark brown. Spores *Physconia*-type, rugulate, 1(–3)-septate, 13.5–18 × 7–8.5 µm. CONIDIOMATA not common, conidia bacilliform, 4–5 µm.

Chemistry. C+ orange, UV+ orange. Arthothelin, trichlor-O-methylnorlichexanthone.

Habitat. Saxicolous, on hard siliceous, often perpendicular rocks.

Distribution. **Gr F:** EnL. **I:** INo. **N:** ØFi. **S:** TL. Otherwise known from various parts of Europe.

Note. Characterized by the yellowish, C+ orange, UV+ orange thallus, sessile apothecia and *Physconia*-type spores.

11. *Buellia disciformis* (Fr.) Mudd

Manual British Lichens: 216 (1861). – *Lecidea parasema* var. *disciformis* Fr., Nova Schedae Crit., fasc. 8: 9 (1826). TYPE: E. Fries, Lich. Suec. Exs. No 215A (UPS lectotype, Kalb & Elix, Mycotaxon 68: 478, 1998).

Syn. *Buellia parasema* (Ach.) De Not., *B. gotlandica* J. Steiner

D: glatbarks-sortskivelav **F:** lepännnyppyjäkälä **S:** rönnav

Literature: Giralt et al., Lichenologist 32: 112–114 (2000).

Figs: Moberg & Holmåsén 1990: 195.

THALLUS thin, areolate, white to grey, irregular, medulla ± amyloid. APOTHECIA sessile, to 1.5 mm diam., margin usually persistent, exciple of radiating hyphae, rim more distinctly pigmented than inner part. Hymenium with oil droplets. Epithymenium brown. Hypothecium brown. Spores *Callispora*-type, smooth, 1-septate, rarely 3-septate, with somewhat pointed apices, 14–30 × 6–13 µm. CONIDIOMATA ± common, conidia subcylindrical, 4–5 × 1 µm.

Chemistry. K+ yellow. Atranorin.

Habitat. Corticolous, on smooth bark of deciduous trees.

Distribution. Common, especially in northern parts. **D:** NJy ØJy. **Gr F:** A V U EK St EH ES LK EP PH PS PK KP Kn OP PeP Ks KiL SoL EnL InL. **N:** Ak He Op Bu Vf Te AA VA Ro Ho SF MR ST NT SNo NNo Tr VFi ØFi. **AI:** Sb. **S:** Bl Õl Gtl Klm Sml Hl Bh Dls Vg Ög Nrk Srm Vrm Vsm Upl Dlr Gst Hls Mpd Ång Hrj Jmt Vb Nb ÅsL LyL PL LL TL. Circumpolar in the Northern Hemisphere. Otherwise locally known from the British Isles, Central Europe and Iberian Peninsula.

Note. Might in the field be mistaken for a *Lecidella* species but is easily recognized by the brown, 1-septate spores and the oil droplets in the hymenium. Includes corticolous Nordic material of *B. triphragmia* (see Nordin 1996).

12. *Buellia dives* (Th.Fr.) Th.Fr.

Lich. Scand. 2: 594 (1874). – *Buellia parasema* ssp. *dives* Th.Fr., Kungl. Vet.-Akad. Förh. 1864: 272 (1864). – TYPE: Sweden, Närke, "Ad epidermidem betulinum ad Himmer, par. Asker", Hellbom (S holotype).

Literature: Giralt, Tønsberg & Holien, Lichenologist 34:1–5 (2002).

THALLUS membranaceous, greyish to whitish, hypothallus black. APOTHECIA immersed to sessile, to 0.8 mm diam. Hymenium without oil droplets. Epihymenium brownish, sometimes with K+ red chrystals. Hypothecium dark brown. Spores *Callispora*-type, 12–16/ascus, 1-septate, 14–18(–21) × 6–9 µm. CONIDIOMATA not seen in Nordic material.

Chemistry. K+ yellow to orange, rarely red. Atranorin, ± norstictic acid, ± connorstictic acid.

Habitat. Corticolous, on *Betula*.

Distribution. N: ST. S: Nrk. Otherwise known from the Iberian Peninsula.

Note. Characterized by the polysporic asci, the *Callispora*-type spores and the *Chemistry*.

13. *Buellia ectolechioides* (Vain.) Erichsen

Verhandl. Bot. Ver. Prov. Brandenburg 72: 45 (1930). – *Melanaspicilia ectolechioides* Vain., Arkiv Bot. 8(4): 77 (1909). – TYPE: Russia, Siberia, "ad lapidem graniticum in regione meridiem versus a pago Pitlekai sita", E. Almquist (TUR-V 9118 lectotype, Foucard, Moberg & Nordin, Nordic Lichen Flora 2:70, 2002).

Syn. *Buellia dubia* (Vain.) Malme, *B. crystallifera* (Vain.) Hav., *B. injucunda* (Vain.) H. Magn., *B. microplaca* (Vain.) Erichsen

Literature: Scheidegger, Lichenologist 25: 348 (1993).

THALLUS granular, consisting of single or a few, scattered areolae, whitish to greyish, medulla ± amyloid. Prothallus usually well-developed, black. APOTHECIA immersed, to 0.4 mm diam., exciple poorly developed. Hymenium without oil droplets. Epihymenium brown to green, N+ reddish. Hypothecium colourless to dark brown. Spores *Buellia*-type, rugulate, 1-septate, 13–18 × 7–10 µm. CONIDIOMATA not seen.

Chemistry. K+ yellow turning red. Norstictic acid.

Habitat. Saxicolous, on granitic rocks in arctic and sub-arctic areas.

Distribution. Gr N: Op Ho SF ST ØFi. S: Hrj LyL LL TL. Otherwise known from the Alps and Siberia.

Note. Very close to and perhaps identical with *B. aethalea*. Separated from that species only by the scattered areolae.

14. *Buellia elegans* Poelt

in Poelt & Sulzer, Nova Hedw. 25: 184 (1974); Trinkaus & Mayrhofer, Nova Hedw. 71: 284 (2000). – TYPE: Italy, Clavennam (Madrèsimo), Anzi, Lich. rar. Langobard. exs. n. 136 (M holotype).

Literature: Trinkaus & Mayrhofer, Nova Hedwigia 71: 284 (2000).

Figs: Poelt & Sulzer 1974:193; Trinkaus, Mayrhofer 2001:286–288.

THALLUS ± orbicular, lobate with up to 1–2 cm long and 0.5 mm broad lobes, lobe endings sometimes flattened and more than 1 mm broad, white, surface farinose to to granular, medulla not amyloid. APOTHECIA rare, 0.3–1.2 mm diam., immersed to sessile. Disc flat to convex, sometimes slightly pruinose, exciple with radiating hyphae, dark brown in inner part, paler in outer part. Hymenium without oil droplets. Epihymenium brownish to greenish. Hypothecium dark brown, but in its lower part sometimes bright orange brown. Spores 8/ascus, rugulate, 1-septate, 12–20(–23) × 5.5–10.5 µm. CONIDIOMATA numerous, conidia bacilliform, 5–8 × 1–1.5 µm.

Chemistry. K+ yellow, P+ orange. Atranorin, ± stictic acid, ± norstictic acid.

Habitat. Muscicolous or terricolous on calcareous soil in dry slopes.

Distribution. N: Op. Otherwise known from the Alps, Central Asia, North and South America.

Note. Characterized by the lobate thallus and 8 spores/ascus. Differs from *B. asterella* by the number of spores/ascus.

15. *Buellia epigaea* (Pers.) Tuck.

Genera Lich.: 185 (1872). – *Lichen epigaeus* Pers., Ann. Bot. (Usteri) 1: 25 (as *Lichen melanocarpus* with correction to *Lichen epigaeus* on p. 155) (1794). – TYPE: Germany, "Ad terram inter muscos non procul a Monte Meisner" (H-ACH isotypus, Poelt & Sulzer, Nova Hedwigia 25: 181, 1974).

Literature: Poelt & Sulzer, Nova Hedwigia 25: 186 (1974); Trinkaus & Mayrhofer, Nova Hedwigia 71: 294 (2000).

Figs: Poelt & Sulzer 1974: 193; Trinkaus & Mayrhofer 2000: 296–298.

THALLUS irregular to areolate or bullate, 1–1.5 cm, white to greyish, medulla not amyloid. APOTHECIA, 0.5–1.5 mm diam., usually pruinose, immersed to sessile, as young often with a thalline rim, exciple inconspicuous, pigmented only in outer part. Hymenium without oil droplets. Epithymenium brown. Hypothecium brown. Spores *Buellia*-type, rugulate, 1-septate, 14–26 × 6–12 µm. CONIDIOMATA not seen.

Chemistry. No secondary substances (by TLC) in Nordic material.

Habitat. Muscicolous or terricolous on calcareous soil in dry slopes.

Distribution. N: He Op NNo. S: Gtl Srm. Otherwise known from central and southern Europe, Central Asia and North America.

Note. Characterized by its habitat, areolate to bullate K– and C– thallus, and rugulate spores.

16. *Buellia erubescens* Arnold

Verh. Zool.-bot. Ges. Wien 25: 493 (1875). – TYPE: Austria, Tirol, Alnus incana im Walde zwischen Passthurm und Kirchamwald, 1873 Arnold (M holotype).

Syn. *Buellia zahlbruckneri* J. Steiner, *B. parasema* var. *saprophila* (Ach.) Körb., *B. subdisciformis* f. *corticola* (Nyl.) Sandst.

D: dugget sortskivelav **F:** salonyppyjäkäälä

Literature: Hafellner, Beih. Nova Hedwigia 62: 71 (1979); Giralt et al., Lichenologist 32: 114–118 (2000).

THALLUS white to greyish, thin, smooth to rimose, sometimes endophloeodal, medulla not amyloid. APOTHECIA 0.5–0.8 mm diam., sessile, when young sometimes pruinose, rim distinct, persistent, exciple dark throughout. Hymenium without oil droplets. Epithymenium brown. Hypothecium dark brown. Spores *Buellia*-type, rugulate, 1-septate with rounded apices, 11–18 × 6–9 µm. CONIDIOMATA sparse, conidia bacilliform, 6–8 µm.

Chemistry. K+ yellow turning red, Pd + yellow-orange. Atranorin, ± norstictic acid.

Habitat. Corticolous or lignicolous on various deciduous trees.

Distribution. F: EH LK PH PS Kn PeP InL. N: Op Bu Vf Ro Ho SF MR ST NT SNo NNo Tr. S: Vrm Dlr Hjr PL

TL. Otherwise known from British Isles, Iberian Peninsula, Central Europe and North America.

Note. Could be mistaken for *B. disciformis* but recognized by its K+ red, rarely K+ yellow, thallus and hymenium without oil droplets.

17. *Buellia geophila* (Flörke ex Sommerf.) Lynge

Meddelelser om Grønland 118(8): 181 (1937). – *Lecidea geophila* Flörke ex Sommerf., Suppl. Florae Lapponicae: 157 (1826). – TYPE: Norway, Nordland, Salten, Sommerfelt (UPS lectotype, Nordin, Symb. Bot. Ups. 31(3): 341, 1996).

Syn. *Buellia trifracta* J. Steiner, *B. triphragmia* (Nyl.) Arnold, *Diplotomma geophilum* (Flörke ex Sommerf.) Szatala ex D. D. Awasthi & S. R. Singh.

D: hede-sortskivelav **S:** markskivlav

Literature: Nordin, Symb. Bot. Ups. 31(3): 341 (1996).

THALLUS irregularly verrucose to granular, white to greyish, with calcium oxalate in cortex, medulla not amyloid. APOTHECIA 0.2–1.2 mm diam., immersed to sessile. Disc flat to ± convex, sometimes pruinose, margin thin, exciple distinctly pigmented throughout, with ± rounded, thick-walled cells, pigment giving K+ yellow solution. Hymenium without oil droplets. Epithymenium brown. Hypothecium brown. Spores 3-septate, indistinctly rugulate, 24–38 × 6–13 µm. CONIDIOMATA rare, conidia bacilliform 4–6 × 1 µm.

Chemistry. Thallus K– or K+ indistinctly yellow, KC+ yellow to orange-yellow, C– but C+ intensely yellow under the microscope, UV+ orange. 6-O-methylarthonelin.

Habitat. Terricolous, rarely corticolous or lignicolous, usually overgrowing mosses and other lichens on calciferous ground in rather humid situations or occasionally on bark or lignum close to the ground.

Distribution. Gr F: V Ks EnL. N: Op ST ØFi. S: Jmt LyL LL TL. Otherwise known from Central Europe and Novaya Zemlya.

Note. Characterized by the KC+ yellow to orange-yellow whitish thallus and the large 3-septate spores. Could be mistaken for other terricolous species of *Buellia*, such as *B. insignis* and *B. papillata*, but those have smaller, 1-septate spores. *B. papillata* also differs by having a thicker thallus containing atranorin. *B. insignis* is not restricted to calciferous habitats and contains 6-O-methylarthonelin. Most

localities harbouring *B. geophila* are situated in subalpine areas. Muscicolous material of *B. triphragmia* is included here (see Nordin 1996).

18. *Buellia griseovirens* (Turner & Borrer ex Sm.) Almb.

Bot. Notiser 1952: 247 (1952). – *Variolaria griseovirens* Turner & Borrer ex Sm., English Botany 36: t. 2400 (1812). – TYPE: England, Stratton Strawless Heath, Norfolk. (BM lectotype, Nordin, Symb. Bot. Ups. 31(3): 342, 1996).

Syn. *Buellia betulina* (Hepp ex Zwackh) Th.Fr., *B. elenkinii* Tomin, *Diploforma betulinum* (Hepp ex Zwackh) Arnold, *Rhizocarpon efflorescens* Th.Fr.

D: grågrøn sortskivelav **F:** koivunnyppyjäkäälä **S:** mjölkskivlav

Literature: Nordin, Symb. Bot. Ups. 31(3): 342 (1996); Tønsberg, Sommerfeltia 14: 113 (1991).

Figs: Wirth 1995: 193.

THALLUS smooth to areolate, greyish, usually forming small patches between other lichens, sometimes endosubstratal. Prothallus brownish, medulla non-amyloid, soralia discrete, rounded, to 0.4 mm diam., rarely confluent, greyish white to pale yellow, often with greenish or bluish tinge. APOTHECIA rare, 0.3–1.5 mm diam., sessile. Disc urceolate to slightly convex, epruinose, exciple well-developed, middle part slightly paler than the dark outer and inner part, with cylindrical, thick-walled cells, pigment giving K⁺ yellow solution. Hymenium without oil droplets. Epithymenium brown. Hypothecium brown. Spores 3-septate to submuriform, indistinctly rugulate, 16–27 × 7–13 µm. CONIDIOMATA rare, conidia 4–6 × 1 µm.

Chemistry. Thallus and soralia K⁺ yellow turning red, P⁺ yellow-orange. Atranorin, norstictic acid, pigments. Low concentrations give diffuse or no reactions.

Habitat. Corticolous, rarely lignicolous, on bark of mainly deciduous trees, especially *Alnus*, *Betula*, and *Sorbus*.

Distribution. **D:** NJy ØJy Fyn Sjæ Brn. **F:** A V U EK EH ES LK PH PS PK KP Ks. **I:** IAu. **N:** Øf Ak He Op Bu Vf Te AA VA Ro Ho SF MR ST NT SNo NNo Tr. **S:** Sk Bl ÖI Gtl Klm SmI HI Bh Dls Vg Ög Nrk Srm Vrm Vsm Upl Dlr Gst Hls Ång LL. Widely distributed also in the rest of Europe and North America. Also found in Tunisia.

Note. Characterized by the discrete, K⁺ red soralia having a bluish or greenish tinge, and by the thick-rimmed, at young stages urceolate apothecia. When lacking apothecia *Buellia*

griseovirens might be mistaken for *Mycoblastus fucatus*, *Fuscidea* spp., and *Buellia arborea*, but it is chemically distinct (TLC).

19. *Buellia insignis* (Nägeli ex Hepp) Körb.

Syst. Lich. Germ.: 230 (1855). – *Lecidea insignis* Nägeli ex Hepp, Flechten Europas, Tab. 6, n. 39(a) (1853). – TYPE: Switzerland, Graubünden. "An der Rinde alter Lerchen und Arven bei St. Moritz", Hepp, Flechten Europas exs. n. 39(a) (UPS lectotype, Foucard, Moberg & Nordin, Nordic Lichen Flora 2: 70, 2002).

THALLUS greyish white, thin, smooth to granulose or verrucose. APOTHECIA to 1.5 mm diam., sessile, discrete to confluent, sometimes pruinose, flat to slightly convex and then ± immarginate, exciple dark throughout. Hymenium without oil droplets. Epithymenium brown. Hypothecium dark brown. Spores *Buellia*-type, rugulate, 1-septate, when old rarely 3-septate, 23–32 × 9–13 µm. CONIDIOMATA sparse, conidia bacilliform 4–5 × 1 µm.

Chemistry. C– but C⁺ yellow under microscope, UV ± brown-orange. 6-O-methylarthothelin.

Habitat. Terricolous, rarely corticolous or lignicolous, usually overgrowing mosses and other lichens on both calcareous and acidic ground, also at bases of *Juniperus* and *Populus*.

Distribution. **Gr F:** PeP Ks KiL EnL InL. **I:** ISu IVE IMi IAu INv INo. **N:** Ak Op Te SF ST NT NNo Tr VFi ØFi. **AI:** Bi Sb. **S:** Upl Hls Ång Hlj Jmt ÅsL LyL PL LL TL. Otherwise known from high mountains in Europe.

Note. Characterized by the habitat, the non-areolate greyish-white thallus containing 6-O-methylarthothelin, and the 1-septate, fairly large spores. Often confused with *B. papillata* which has a white bullate, K⁺ yellow thallus.

20. *Buellia jugorum* (Arnold) Arnold

Flora 67: 588 (1884). – *Buellia verruculosa* var. *jugorum* Arnold, Verh. zool.bot. Ges. Wien 28: 295 (1879). – TYPE: Austria, Tyrol, "an Glimmergesteinen der Einsattlung der Bergschneide östlich oben den Plendele Seen, Küthei", 1877 Arnold (M lectotype, Scheidegger, Lichenologist 25: 351, 1993).

Literature: Scheidegger, Lichenologist 25: 351 (1993).

THALLUS areolate, to 1.8 mm, slightly placodioid, white to yellow with smooth surface, medulla not amyloid. APOTHECIA 0.3–0.6 mm diam., immersed or broadly sessile, exciple brownish in outer part, pale in inner part. Hymeni-

um without oil droplets, green in lower part. Epihymenium greenish brown, N+ reddish. Hypothecium dark brown. Spores *Buellia*-type, rugulate, $11-15 \times 6-8.5 \mu\text{m}$. CONIDIOMATA immersed, conidia bacilliform, $6-9 \times 1 \mu\text{m}$.

Chemistry. C+ orange, UV+ orange. Arthothelin.

Habitat. Saxicolous, on small pebbles in very windy localities in alpine regions.

Distribution. **I:** IAU INo. **N:** Op ØFi. **S:** Hrj TL. Otherwise known from the Alps and the Pyrénées.

Note. Similar to *B. ocellata* but differs by its alpine distribution and longer conidia. Furthermore, the areolae are a little larger with a smooth surface, and in the periphery they are slightly placodioid.

21. *Buellia leptocline* (Flot.) Körb.

Syst. Lich. Germ.: 255 (1855). – *Lecidea leptocline* Flot., Bot. Zeitung 8: 555 (1850). – TYPE: Poland, "Seifersdorf bei Hirschberg, Grünstein", 1841 Flotow (UPS neotype, Scheidegger, Lichenologist 25: 352, 1993).

Syn. *Buellia gevrensis* Th.Fr., *B. hypopodioides* (Nyl.) Arnold

F: kallionypyjäkälä

Literature: Scheidegger, Lichenologist 25: 352 (1993).

THALLUS rimose to areolate, whitish to grey, thin to thick, medulla strongly amyloid. APOTHECIA lecideine, 0.5–1.2 mm diam., sessile with constricted base, margin thick and prominent, exciple of intricate hyphae homogeneously dark-pigmented and with orange-red pigment (K+ reddish solution). Hymenium without oil droplets. Epihymenium brown. Hypothecium dark brown. Spores *Physconia*-type, not constricted, rugulate or rarely smooth, $12-16 \times 7.5-8.5 \mu\text{m}$. CONIDIOMATA immersed, conidia bacilliform, $4-5 \mu\text{m}$.

Chemistry. K+ yellow. Atranorin.

Habitat. Saxicolous, on perpendicular and overhanging, rain-exposed parts of siliceous boulders in subalpine to alpine regions.

Distribution. **Gr F:** St EH EP PS PK PeP Ks EnL InL. **N:** Ak He Op Ho MR ST SNo VFi ØFi. **S:** Bl Gtl Bh Vg Ög NrK Vrm Hls Mpd Hrj Jmt Vb LyL LL TL. Otherwise known from Britain and Central Europe.

Note. Characterized by its amyloid medulla, large sessile apothecia with thick margin, excipular pigment giving a reddish solution in K. "*Buellia saxorum*" reported from Sweden, Värmland is *Buellia leptocline*.

22. *Buellia miriquidica* Scheid.

Bot. Helvetica 97: 112 (1987). – TYPE: Germany, Baden-Württemberg, "Urberg-Schwand bei St. Blasien", 1969 Wirth (Herb. Wirth No 1665 holotype).

Literature: Scheidegger, Lichenologist 25: 353 (1993).

Figs: Wirth 1995: 191.

THALLUS areolate, grey, medulla amyloid. APOTHECIA 0.2–0.8 mm diam., immersed to sessile. Disc plane to convex with thin margin, exciple of mainly pigmented in outer part. Hymenium without oil droplets. Epihymenium brown to olive. Hypothecium brown. Spores *Buellia*-type, broadly oblong, constricted at septum, smooth, 1-septate, $6-8 \times 3.5-5 \mu\text{m}$. CONIDIOMATA immersed, conidia bacilliform, $3.5-4 \mu\text{m}$ long.

Chemistry. Miriquidic acid.

Habitat. Usually growing on *Schaereria fuscocinerea* on vertical faces of hard granitic rocks in alpine and arctic regions.

Distribution. **N:** ØFi. **S:** Bh Vrm Jmt Nb LyL TL. Otherwise known from alpine regions in Central Europe.

Note. *B. uberior* also grows on *Schaereria fuscocinerea* but *B. miriquidica* is easily separated from that species by its C– thallus and smooth spores.

23. *Buellia ocellata* (Flot.) Körb.

Syst. Lich. Germ.: 224 (1855). – *Lecidea petraea* var. *ocellata* Flotow, Flora 11: 691 (1828). – TYPE: Germany, Baden-Württemberg, Steinbühl, Kemmler (BM neotype, Laundon, Lichenologist 18: 170, 1986).

Syn. *Buellia verruculosa* auct. non (Sm.) Mudd

Literature: Laundon, Lichenologist 18: 170–171 (1986); Scheidegger, Lichenologist 25: 353 (1993).

THALLUS areolate, to 1.3 mm, yellowish to grey-white, sometimes with a greenish tone, surface ± uneven to finely wrinkled, medulla not amyloid. APOTHECIA 0.2–0.5 mm diam., immersed, exciple usually absent or reduced. Hyme-

nium without droplets, lower part greenish. Epithymenium brown to greenish, N+ reddish. Hypothecium dark brown. Spores *Buellia*-type, slightly constricted, rugulate, 11–20 × 6–11 µm. CONIDIOMATA immersed, conidia bacilliform, 4–6 µm long.

Chemistry. Thallus C+ orange, UV+ orange. Arthothelin, ± stictic acid.

Habitat. Saxicolous, on siliceous rocks.

Distribution. **D:** NJy Fyn Brn. **Fa I:** I Au INv **N:** ØFi. **S:** Sk Gtl SmI Vg. Otherwise known from British Isles, Central Europe and the Mediterranean area.

Note. Characterized by the chemistry, the immersed apothecia, the southern distribution, and the short conidia. See *B. jugorum*.

24. *Buellia papillata* (Sommerf.) Tuck.

Lich. Calif.: 26 (1866). – *Lecidea papillata* Sommerf., Suppl. Fl. Lapp.: 154 (1826). – TYPE: Norway, Nordland, Saltalalen, Sommerfelt (O lectotype, Foucard, Moberg & Nordin, Nordic Lichen Flora 2: 70, 2002).

Literature: Degelius, Botaniska Notiser 1945: 402 (1945).

THALLUS convex areolate to bullate, white to greyish white. APOTHECIA to 1.0 mm diam., sessile, discrete to confluent, sometimes pruinose, soon convex and immarginate, when young often with a thalline rim, exciple dark-pigmented. Hymenium without oil droplets. Epithymenium brown. Hypothecium brown. Spores *Buellia*-type, rugulate, 15–25 × 7–10 µm. CONIDIOMATA not seen.

Chemistry. K+ yellow. Atranorin.

Habitat. Muscicolous and saxicolous in alpine areas.

Distribution. **Gr I:** IMi INo **N:** ST NNo Tr VFi ØFi. **S:** LyL TL. Otherwise known from Scotland and the Alps.

Note. Has often been mistaken for *B. insignis* but differs by its white, ± bullate thallus containing atranorin and its smaller spores.

25. *Buellia pharcidia* (Ach.) Malme

Lich. Suec. exs. no. 182. – *Lecanora pharcidia* Ach., Syn. Lich.: 147 (1814). – TYPE: Gallia (UPS-ACH lectotype, Nordin, Symb. Bot. Ups. 31(3): 343, 1996).

D: skov-sortskivelav **F:** etelännypyjäkälä

Redlisted in: **D:** V

Literature: Nordin, Symb. Bot. Ups. 31(3): 343 (1996).

THALLUS. Thallus smooth or rimose, whitish to dark grey, usually in small patches surrounded by dark-brown prothallus, medulla not amyloid. APOTHECIA 0.4–1.0 mm diam., first immersed, later ± sessile. Disc flat to seldom ± convex, sometimes pruinose, exciple well-developed, distinctly pigmented in outermost part, paler in inner part, with ± rounded, thin-walled cells in major part and thick-walled, elongate cells in innermost part. Hymenium without oil droplets. Epithymenium brown. Hypothecium brown. Spores 3-septate or with additional longitudinal septa on each side of the middle septum, often irregular, rugulate, 15–23 × 6–9 µm. CONIDIOMATA rare, conidia 7–10 × 1 µm.

Chemistry. No secondary substances (by TLC) in Nordic material.

Habitat. Mainly corticolous on ± smooth bark of various deciduous trees, such as *Fraxinus*, *Populus tremula*, *Salix* etc., rarely on conifers and wood.

Distribution. **D:** ØJy Sjæ Brn. **F:** A U EH. **S:** Sk BI ÖL Gtl Klm HI Bh Dls Vg Ög Nrk Srm Upl. Widespread but seemingly rare in the rest of Europe. Also known from Algeria.

Note. Characterized by the predominantly 3-septate spores and the well-developed exciple surrounded by a thalline veil. Sometimes not easily distinguished from *Buellia alboatra*, which has predominantly 8-celled spores and a less well-developed exciple. Seems to have declined in recent decades.

26. *Buellia pulverulenta* (Anzi) Jatta

Syll. Lich. ital.: 400 (1900). – *Abrothallus pulverulentus* Anzi. – TYPE: Italy, Valviola presso Premadio, Anzi (L lectotype, Foucard, Moberg & Nordin, Nordic Lichen Flora 2: 71, 2002, as "holotype", Hafellner, Nova Hedwigia Beih. 62: 64, 1979).

Syn. *Buellia convexa* Th.Fr., *Celidium pulverulentum* (Anzi) Olivier, *Dactylospora pulverulenta* (Anzi) Arnold, *Karschia pulverulenta* (Anzi) Körb., *Leciographa muscigenae* (Anzi) Rehm

D: snylte-sortskivelav **S:** snyltskivlav

Literature: Nordin, Symb. Bot. Ups. 31(3): 343 (1996); Hafellner, Nova Hedwigia Beih. 62: 64 (1979); Hafellner & Poelt, Phytot. 20: 129 (1980).

THALLUS consisting of hyphal system developed inside host thallus. APOTHECIA 0.1–0.7 mm diam., emerging from host thallus, soon sessile. Disc soon convex, sometimes prui-nose, margins often with residues of host epinecral layer, exciple distinctly pigmented throughout, with ± rounded, rather thick-walled cells. Hymenium without oil droplets. Epihymenium brown. Hypothecium brown. Spores (1–)3-septate, rugulate, 15–23 × 6–9 µm. CONIDIOMATA rare, conidia 5–6 × 1 µm.

Chemistry. No secondary substances (by TLC) in Nordic material.

Habitat. Endoparasitic, mainly on *Physconia muscigena*. Also on various saxicolous *Physconia*, *Physcia* and *Phaeophyscia* species, rarely on corticolous *Physcia* spp.

Distribution. **Gr. I:** IMi I Au INo. **N:** *Op ST ØFi*. **S:** *Dlr Hrj Jmt ÅsL LL TL*. Widespread but rare in arctic or subalpine areas in the rest of Europe, Siberia, N. America, and southernmost S. America.

Note. Characterized by the endoparasitic life form and the predominantly 3-septate spores.

27. *Buellia schaeereri* De Not.

Giorn. Bot. Ital. 2: 199 (1846). – TYPE: Switzerland, Schaeerer, Lich. Helv. Exs. No 200 (E lectotype, Foucard, Moberg & Nordin, Nordic Lichen Flora 2: 71, 2002).

D: Schaerers sortskivelav **F:** kääpiänpyppjäkälä

Redlisted in: **D: V**

THALLUS thin, often indistinct, greyish, medulla not amyloid. APOTHECIA 0.2–0.4 mm, sessile, exciple indistinct. Hymenium without oil droplets. Epihymenium brown. Hypothecium brown. Spores pale brown, of *Buellia*-type, 1-septate, 6–11 × 3–4 µm. CONIDIOMATA often numerous, conidia narrowly ellipsoid, 2–3 × 1–1.5 µm.

Chemistry. No secondary substances (by TLC) in Nordic material.

Habitat. Corticolous, on *Quercus*, *Pinus*, etc., or ligni-colous, often on old buildings.

Distribution. **D:** ØJy Fyn Sjæ. **F:** A V U St EH ES PH PS KP OP PeP Ks KiL EnL InL. **N:** Ak He Op MR ST. **S:** Bl Öl Gtl Klm SmI Bh Vg Ög Nrk Srm Vrm Vsm UpI Dlr Gst Hls Htrj LyL. Otherwise known from the British Isles and Central Europe.

Note. Characterized by the indistinct thallus, and small apothecia with small, pale brown spores. Can be confused with *Amandinea punctata* but the spores and the conidia are smaller.

28. *Buellia stellulata* (Taylor) Mudd

Manual Brit. Lich.: 216 (1861). – *Lecidea stellulata* Taylor in Mackay, Flora Hibernica 2: 118 (1836). – TYPE: Ireland, Kerry (Craig?) Mountains, Taylor (BM lectotype, Foucard, Moberg & Nordin, Nordic Lichen Flora 2: 71, 2002).

Redlisted in: **D: V**

Literature: Scheidegger, Lichenologist 25: 357 (1993).

THALLUS rimose, to 1 cm diam., whitish, medulla not amyloid. APOTHECIA immersed, 0.1–0.3 mm diam., exciple inconspicuous, dark-pigmented in outer part. Hymenium without droplets. Epihymenium olive-green to olive-brown, N+ reddish. Hypothecium dark brown. Spores *Buellia*-type, rugulate to smooth, 10–13 × 5–7 µm. CONIDIOMATA immersed, conidia bacilliform, 3.5–5 µm.

Chemistry. Thallus K+ yellow. Atranorin, confluent acid, 2'-*O*-methylperlatolic acid.

Habitat. Saxicolous, on sun-exposed, siliceous rocks.

Distribution. **D:** ØJy Sjæ Brn. **Gr I:** IMi **N:** Ro Ho. **S:** Sk Öl Bh. Otherwise known from southern and central Europe.

Note. Characterized by the whitish, K+ yellow thallus, the non-amyloid medulla, and the small, immersed apothecia. Might be mistaken for *B. aethalea*, but the chemistry is different (TLC), the spores and conidia are smaller, and the thallus is usually whiter.

29. *Buellia subdispersa* Mig.

Krypt.-Fl. Deutschl., Flecht., Abt. 2, vol 12: 88 (1924): 88. – *Diplotomma alboatrum* γ *dispersum* Kremp., Lich. Bay.: 209 (1861). – Type: Germany, Bayern, "Wallberg bei Tegenersee, an einem Kalkfelsen", 1859 Krempelhuber (M lectotype, Nordin, Bryologist 102: 257, 1999).

Syn. *Diplotomma dispersum* (Kremp.) Arnold

S: liten kalkskivlav

Literature: Nordin, Bryologist 102: 257 (1999), Symb. Bot. Ups. 33(1): 91 (2000).

THALLUS minutely areolate; areolae sometimes crowded, forming small contiguous patches, whitish, with calcium

oxalate in cortex, medulla often amyloid. APOTHECIA immersed to sessile, 0.1–0.5 mm diam.. Disc flat to ± convex, sometimes with thin, whitish pruina, margin sometimes with thalline granules, exciple distinctly pigmented only in outermost part, with ± rounded, rather thin-walled cells. Hymenium without oil droplets. Epithymenium brown. Hypothecium pale to dark brown. Spores 3-septate, sometimes curved, rugulate, 12–18 × 5–8 µm. CONIDIOMATA not seen.

Chemistry. Thallus K–, C–, P–. No substances detected with TLC.

Habitat. Saxicolous, on calciferous rocks and mortar.

Distribution. **Gr. I:** INo **N:** SNo NNo. **S:** Gtl Upl Dlr. Otherwise known from Central Europe, Siberia and N. & S. America.

Note. Characterized by the scattered areolae of the thallus, the small apothecia, and the 3-septate spores. Might be mistaken for *Buellia alboatra* or a poorly developed *B. venusta*, the former distinguished by having submuriform spores, the latter distinguished by having larger apothecia and spores and a thicker, more contiguous thallus. Less than ten localities known in the area.

30. *Buellia tesserata* Körb.

Parerga Lich.: 189 (1860). – TYPE: Norway, "An Schieferfelsen Norwegens von Hübner und Kurr gesammelt" (L lectotype, Foucard, Moberg & Nordin, Nordic Lichen Flora 2: 71, 2002, isolectotype UPS).

Literature: Scheidegger, Lichenologist 25: 359 (1993).

THALLUS areolate, white. Prothallus black, fimbriate, medulla not amyloid. APOTHECIA immersed, 0.3–0.5 mm diam., exciple inconspicuous, dark-pigmented in outer part. Hymenium without oil droplets. Epithymenium brown. Hypothecium dark brown. Spores *Buellia*-type, constricted at septum, 1-septate, 9–11 × 5–6 µm. CONIDIOMATA not seen.

Chemistry. Barbatic acid.

Habitat. Saxicolous, on schistose rocks.

Distribution. **Gr N:** Not indicated.

Note. Known only from the type locality. Resembles *B. fimbriata*, differs only by its *Chemistry*. Mislabelled material? (see also Scheidegger 1993: 359).

31. *Buellia triphragmioides* Anzi

Atti della società Italiana di Scienze naturali 11: 171 (1868). – TYPE: Italy, Bormio, Anzi (TO not seen).

Syn. *Buellia thionella* Norman

D: espe-sortskivelav **S:** gulskivlav

Literature: Nordin, Symb. Bot. Ups. 31(3): 345 (1996).

THALLUS areolate to verrucose, yellowish, usually in small patches, medulla non amyloid. Prothallus not seen. APOTHECIA 0.2–0.9 mm diam., sessile. Disc flat to ± convex, sometimes with thin, yellowish pruina of xanthone crystals, margin first prominent, later excluded, exciple distinctly pigmented throughout, with ± rounded, rather thick-walled cells. Hymenium without oil droplets. Epithymenium brown. Hypothecium brown. Spores 3-septate, sometimes curved, ruggedly rugulate, 19–28 × 7–10 µm. CONIDIOMATA rare, conidia 5–7 × 1 µm.

Chemistry. Thallus K–, C+ orange, P–. Arthothelin present, sometimes also traces of other xanthenes.

Habitat. Corticolous or lignicolous on deciduous trees, such as *Salix caprea*, sometimes also on conifers.

Distribution. **N:** He Op Bu SF ST SNo NNo Tr VFi. **S:** Hrj Jmt LL TL. Otherwise known from South Europe, NW Russia (Murmansk Reg.), Siberia and North America.

Note. Characterized by the C+ orange, yellowish thallus and the 3-septate spores. Rare, restricted to subalpine areas.

32. *Buellia uberior* Anzi

Atti Soc. Sci. Nat. 9: 252 (1866). – TYPE: Italy, Lombardia, Alpe Braulio, valle Zebro, Anzi (M lectotype, Scheidegger, Bot. Helvetica 97: 105, 1987).

Literature: Scheidegger, Lichenologist 25: 360 (1993).

Figs: Wirth 1995: 191.

THALLUS areolate, greyish, shiny, as parasymbiotic on *Schaereria fuscocinerea*, delimited by a black prothallus, medulla amyloid. APOTHECIA immersed, 0.2–0.8 mm diam.. Hymenium without oil droplets. Epithymenium olive-green to olive-brown, N+ reddish. Hypothecium hyaline to light brown. Spores *Buellia*-type, constricted at septum, striate, 8–11.5 × 4.5–6.5 µm. CONIDIOMATA immersed, conidia oblong 3.5–4 × 1–1.5 µm.

Chemistry. Thallus C+ red, K– or K+ yellow-orange. Gyrophoric acid, ± stictic acid.

Habitat. At least when young as a lichenicolous lichen on *Schaereria fuscocinerea* on wind-exposed, siliceous rocks.

Distribution. **Gr N:** Ho SNo ØFi. **S:** Vg Hrj TL. Otherwise known from Novaya Zemlya, Britain, the Alps, Poland, Spain and North America.

Note. Characterized by the association with *Schaereria fuscocinerea*, the C+ red thallus, and the striate spores.

33. *Buellia venusta* (Körb.) Lettau

Hedwigia 52: 244 (1912). – *Diplotomma venustum* Körb., Parerga Lichenologica: 179 (1860). – Type: "Ad saxa calcarea in alpinis Carpathicis", Hazslinszky (Körber, Lich. Sel. Germ. no. 191) (UPS lectotype, Nordin, Symb. Bot. Ups. 31(3): 346, 1996).

Syn. *Buellia epipolia* auct. non (Ach.) Mong.

S: stor kalkskivlav

Redlisted in: **D:** Ex

Literature: Nordin, Symb. Bot. Ups. 31(3): 346 (1996).

THALLUS thick, smooth to rimose, often subeffigurate, white to greyish or ochraceous, with calcium oxalate in cortex, orbicular to irregular, medulla non amyloid. APOTHECIA 0.3–1.2 mm diam., long remaining immersed, eventually raised above thallus surface. Disc flat to convex, often pruinose, margin usually with thalline rim surrounded by high cracks, exciple usually poorly developed, distinctly pigmented only in outermost part, with ± rounded, rather thin-walled cells. Hymenium without oil droplets. Epihymenium brown. Hypothecium dark brown. Spores 3-septate, usually curved, rarely with middle cells divided by longisepta, rugulate, 14–24 × 6–9 µm. CONIDIOMATA rare, conidia 9–12 × 1 µm.

Chemistry. Sometimes K+ yellow turning red, P+ yellow-orange. ± Norstictic acid.

Habitat. Saxicolous, on calcareous rocks and mortar. Sometimes establishing on *Lecanora* spp.

Distribution. **Gr F:** V. **N:** Ak Te ST SNo VFi. **S:** Öl Gtl SmI Vg Ög. Widespread in areas with calcareous bedrock in the rest of Europe, N. Africa, N. America, and Asia.

Note. Characterized by the whitish thallus, the usually immersed, often pruinose apothecia, surrounded by a thalline

rim, and the 3-septate, curved spores. Might be mistaken for *Buellia subdispersa* when poorly developed.

34. *Buellia vilis* Th.Fr.

Kungl. Vetensk.-Akad. Handl. 7(2): 44 (1867). – TYPE: Svalbard, ad saxa litore occidentali, Nordenskjöld (not seen)

Literature: Scheidegger, Lichenologist 25: 361 (1993).

THALLUS very thin to endolithic, strongly amyloid. APOTHECIA lecideine, 0.15–0.6 mm diam., sessile, constricted at base, margin persistent, exciple of radiating hyphae, outer part dark-pigmented, N+ purple, inner part unpigmented and strongly amyloid. Hymenium without oil droplets. Epihymenium dark green to brown. Hypothecium hyaline, strongly amyloid. Spores *Buellia*-type, smooth to rugulate, 1-septate, 12–15 × 7.5–9 µm. CONIDIOMATA sessile, conidia bacilliform, 2.5–4 µm long.

Chemistry. No secondary substances (by TLC) in Nordic material.

Habitat. Saxicolous, on small pebbles and recently eroded granitic rock faces in very wind-exposed, alpine regions.

Distribution. **Gr I:** ISu IAu. **N:** ST NNo. **S:** Vrm Jmt LyL LL. Otherwise known from central and southern Europe.

Note. Characterized by its unusual exciple (Scheidegger 1993: 327) and its hyaline hypothecium.

35. *Buellia violaceofusca* Thor & Muhr

Lichenologist 23: 11 (1991). – TYPE: Sweden, Värmland, Visnum Kil par., Nötön Nature Reserve, Årskogen, near Lake Vänern, 1985 Muhr 7911 (UPS holotype)

S: blyertslav

Redlisted in: **S**

Figs: Swedish Red Book of Lichens 1999, p. 239.

THALLUS endophloeodal or granular, pale grey to whitish, medulla not amyloid, soralia abundant, scattered, maculiform to confluent, dark brownish with a violet tinge. APOTHECIA and CONIDIOMATA not known.

Chemistry. No secondary substances (by TLC) in Nordic material.

Habitat. Corticolous, in bark crevices of old trees, mainly *Quercus robur*.

Distribution. S: Sk ÖI Klm SmI HI Bh Dls Vg Ög Nrk Srm Vrm Vsm Upl Gst. Otherwise known from Scotland, Belgium and Austria.

Note. Characterized by the grey, thin thallus, more or less covered with violet-brown soralia (probably not a *Buellia*).

Dimelaena R. Moberg

Dimelaena Norman

Nytt Mag. Naturvid. 7(3): 231 (1852 sep. print); Conat. Praem. Gen. Lich.: 19 (1852). – TYPE: *Dimelaena oreina* (Ach.) Norman

Literature: Sheard, Bryologist 77: 128–141 (1974); Bryologist 80: 100–118 (1977); Hafellner, Mayrhofer & Poelt, Herzogia 5: 58 (1979); Mayrhofer, Matzer, Whippel & Elix, Mycotaxon 58: 293–311 (1996).

THALLUS placodioid to crustose, areolate to lobate, sometimes bullate. APOTHECIA lecanorine, immersed. Hymenium without oil droplets. Epithymenium brown. Hypothecium pale; asci 8-spored. Spores 1-septate, brown, wall equally thickened. CONIDIOMATA immersed, conidia subcylindrical. PHOTOBIONT trebouxioïd.

Chemistry. See below.

Note. Recognized by the more or less lobate thallus.

1. Dimelaena oreina (Ach.) Norman

Nytt Mag. Naturvid. 7(3): 231 (1852 sep. print); Conat. Praem. Gen. Lich.: 19 (1852 sep. print). – *Lecanora straminea* β *oreina* Ach., Lichenogr. Universalis: 433 (1810). – TYPE: Switzerland, "Helvetia", Schleicher 452 (H-ACH 1018A lectotype, Sheard & Ahti, Ann. Bot. Fenn. 12: 89, 1975).

Syn. *Rinodina oreina* (Ach.) A.Massal.

D: gul fjeldrosetlav **S:** berglav

Literature: Sheard & Ahti, Ann. Bot. Fennici 12: 89–92 (1975).

Figs: Moberg & Holmåsén 1990: 197; Wirth 1995: 374.

THALLUS yellowish, placodioid, areolate, sometimes bullate, margin distinctly lobate. APOTHECIA immersed, flat to convex. Spores 1-septate, brown, 9–15 × 5–7 μm. CONIDIOMATA immersed, conidia subcylindrical, 5–6 μm.

Chemistry. K–, KC+ yellow, P–, rarely P+ red, C– or C+ red. Six major chemotypes are known worldwide (e.g. Leuckert et al., Bot. Jahrb. Syst. 108: 373–379, 1987). In our area most populations represent the chemotype III (usnic acid only), but also chemotype I (usnic acid, fumar-protocetraric acid) is found in Norway. Chemotype II (usnic acid, gyrophoric acid, with some lecanoric and perhaps ovoid acid) is present in Greenland.

Habitat. Saxicolous, on siliceous and basaltic rocks in alpine or subalpine areas in Scandinavia.

Distribution. Mainly alpine to subalpine with one coastal locality in Ångermanland, Sweden. **Gr F:** EnL. **N:** He Op Ho SF MR ST Tr VFi. **AI:** Sb. **S:** Dlr Ång Hrj Jmt LL TL. Otherwise known from the Alps, Asia, Africa and North and South America.

Note. Recognized by the yellowish, placodioid thallus with lobate margin.

Diploicia R. Moberg

Diploicia A.Massal.

Ricerca sull'autonomia dei licheni crostosi 86 (1852). – TYPE: *Diploicia canescens* (Dicks.) A. Massal.

Literature: Hafellner, Mayrhofer & Poelt, Herzogia 5: 58 (1979); Matzer, Mayrhofer & Rambold, Nord. J. Bot 17: 433–438 (1997).

THALLUS placodioid, lobate, firmly adnate, appearing crustose, without rhizinae, grey to almost white, often covered by pruina. APOTHECIA developing inside the thallus, when ripe only the upper part appearing above the surface. Asci 8-spored. Spores brownish, 2-celled, thick-walled. CONIDIOMATA immersed, conidia cylindrical with one side ± swollen, 7–9 × 1 μm. PHOTOBIONT trebouxioïd.

Chemistry. K+ yellow, atranorin, diploicin, secalonic acid, unidentified xanthone.

Note. The closely adnate, lobate, white thallus and the dark, 2-celled spores are the main characters for the genus.

1. Diploicia canescens (Dicks.) A.Massal.

Ricerca sull'autonomia dei licheni crostosi (Ric. Auton. Lich. Crost.): 86 (1852). – *Lichen canescens* Dicks., Fasc. Pl. Crypt. Brit. 1: 10 (1785). – TYPE: [British Isles] In muris et truncis arborum passim, Fasc. Pl. Crypt. Brit. t. 2 f. 5 (lectotype, Moberg,

Nordic Lichen Flora 2: 71, 2002); Dickson, Hort. Sicc. Brit. Fasc. 13, No. 24 (BM epitype, Moberg, Nordic Lichen Flora 2: 71, 2002).

Syn. *Buellia canescens* (Dicks.) De Not.

D: grå støvrossetlav **S:** skorpdagglav

Redlisted in: **S**

Figs: Wirth 1987: 185; 1995: 377.

THALLUS placodioid, lobate, adnate by the whole underside, to 3 cm diam., whitish grey with a dense pruina. Lobes convex, to 2 mm broad, not distinctly separated. Soralia marginal to laminal, crater-like in the beginning, often totally covering central parts. Medulla yellowish. **APOTHECIA** and **CONIDIOMATA** not seen in Nordic material.

Chemistry. K⁺ yellow. Atranorin, diploicin, unidentified xanthone.

Habitat. Corticolous, on tree trunks and rocks in open situations.

Distribution. Rare in the Nordic countries. **D:** ØJy Fyn Sjø Brn. **N:** Ho. **S:** Sk. Otherwise known from temperate Europe, Atlantic Islands, North Africa, North America, Near East, Japan, and Australia.

Note. Characterized by the placodioid thallus and the whitish grey colour.

Heterodermia

R. Moberg

Heterodermia Trevis.

Atti Soc. Ital. Sci. Nat. 11: 613 (1868). – TYPE: *Heterodermia speciosa* (Wulfen) Trevis. (lectotype, Poelt, Nova Hedwigia 9: 31, 1965).

Literature: Kurokawa, Beiheft Nova Hedwigia 6: 23 (1962); Moberg & Purvis, Symb. Bot. Ups. 32(1): 187–194; Moberg & Nash, Bryologist 102: 1–14 (1999).

THALLUS foliose, lobate with discrete or overlapping lobes, more or less closely adnate, greyish, upper cortex prosoplectenchymatous, lower cortex absent or prosoplectenchymatous. **APOTHECIA** lecanorine, sessile or shortly stipitate with brown to black disc. Asci cylindrical, 8-spored with brown, 1-septate spores of *Pachysporaria*-type, usually more than 30 µm long; paraphyses branched,

thickened and brown at tips. **CONIDIOMATA** immersed except for the dark mouth, conidia subcylindrical, to 5 µm. **PHOTOBIONT** *Trebouxia*.

Chemistry. K⁺ yellow, atranorin, zeorin, unidentified tri-terpenes (Nordic material only).

Note. Characterized by greyish colour, prosoplectenchymatous upper cortex with K⁺ yellow reaction (atra-norin), brown, 1-septate spores of *Pachysporaria*-type.

Only one species in the Nordic countries, *H. speciosa*.

1. *Heterodermia speciosa* (Wulf.) Trevis.

Atti Soc. Ital. Sci. Nat. 11: 614 (1868). – *Lichen speciosus* Wulf. in Jacquin, Collectanea 3: 119 (1791 "1789"). – *Anaptychia speciosa* (Wulf.) A. Massal., Mem. Lich.: 36 (1853). – TYPE: [Austria] Montis Calvariae saxis, Wulfen, Collectanea 3 t. 7 (lectotype, Moberg, Nordic Lichen Flora 2: 71, 2002); Switzerland, Tessin, 5 km S of Bellinzona, 1934 Degelius (UPS epitype, Moberg, Nordic Lichen Flora 2: 71, 2002).

D: roset-elfenbenslav **F:** siimesjäkäälä **N:** elfenbenslav **S:** elfenbenslav

Redlisted in: **F N S**

Literature: Hakulinen, Arch. Soc. Zool.-Bot. Fenn. Vanamo 17: 124–125, 131–132 (1962).

Figs: Moberg & Holmåsén 1990: 194; Wirth 1987: 209; 1995: 419.

THALLUS orbicular to irregular, to 4 cm diam., often coalescing with other thalli, ± firmly adnate, white to cream-coloured or brownish grey, appearing bluish by the dense soralia, ± shiny, very rarely pruinose. Lobes narrow, to 2 mm, flat to convex, slightly widening towards apices. Soralia abundant, lip-shaped on lateral lobes, soredia grey to bluish grey. Lower side pale to dark brown with few scattered, short and robust, usually black rhizinae. Lower cortex present, prosoplectenchymatous. **APOTHECIA** and **CONIDIOMATA** not seen in Nordic material.

Chemistry. K⁺ yellow; atranorin, zeorin, unidentified tri-terpene.

Habitat. Muscicolous, mainly on steep rocks or boulders in damp situations, rarely on trunks of trees.

Distribution. Fairly common, but scattered in Norway but very rare in Sweden and Finland. **F:** V EH ES PK Kn Ks SoL. **N:** Op Bu Te Ho SF ST Tr. **S:** Dlr Gst Hrj Jmt Vb LL. Widely distributed in subtropical to temperate areas.

Note. Characterized by the striking contrast between the blue-grey soralia and the paler thallus, the wax-like upper-side (ivory) and the presence of lower cortex.

Hyperphyscia

R. Moberg

Hyperphyscia Müll. Arg.

Bull. Herb. Boissier 2, App. 1: 10 (1894). – TYPE: *Physcia plinthiza* Nyl.

Syn. *Physciopsis* M. Choisy, Bull. Soc. Linn. Lyon 19: 20 (1950). – TYPE: *Physciopsis adglutinata* (Flörke) M. Choisy

Literature: Moberg, Symb. Bot. Ups. 22(1): 77 (1977).

THALLUS foliose, lobate, closely adnate, brownish, usually very small thalli (rarely exceeding 2 cm). Underside brownish at tips with few pale rhizinae, in inner parts mostly joined with the substrate. Upper cortex paraplectenchymatous, medulla of loosely interwoven hyphae, lower cortex prosoplectenchymatous when detectable. APOTHECIA lecanorine, laminal, sessile with brown to black disc. Asci cylindrical, 8-spored with brown 1(–3, not Nordic material)-septate spores of *Physcia*- to *Pachysporaria*-type, paraphyses branched, thickened and brown at tips. CONIDIOMATA immersed, conidia filiform, 15–20 µm long. PHOTOBIONT *Trebouxia* or *Pseudotrebouxia*.

Chemistry. Several orange substances including skyrin detected but not in the Nordic species.

Note. The small size, the appressed thallus and the filiform conidia are distinct features of the genus.

1. *Hyperphyscia adglutinata* (Flörke) H. Mayrhofer & Poelt

in Hafellner, H. Mayrhofer & Poelt, Herzogia 5: 62 (1979). – *Lecanora adglutinata* Flörke, Deutsche Lichenen gesammelt und mit Anmerkungen 4: 7 (1819). – *Physciopsis adglutinata* (Flörke) M. Choisy, Bull. Soc. Linn. Lyon 19: 20 (1950). – TYPE: Germany, Baden Mosbach, 1928 Degelius (UPS neotype; Moberg, Symb. Bot. Ups. 22(1): 78, 1977).

D: tiltrykt dugrosetlav **F:** siimesjäkäliä **N:** smårosett-lav **S:** dvärgrosett-lav

Redlisted in: **N S**

Literature: Moberg, Symb. Bot. Ups. 22(1): 78 (1977).

THALLUS mostly orbicular, to 2 cm diam., thin and closely adnate, brownish grey to dark brown. Lobes to 0.5 mm broad, often overlapping. Soralia mainly laminal, punctiform to ± capitate. Lobes closely adnate except for the outermost part where the few and short rhizinae are present. APOTHECIA rare, to 1 mm diam. Spores 13–18 × 7–10 µm. CONIDIOMATA immersed, sparse, conidia filiform, 15–20 µm long.

Chemistry. No secondary substances (by TLC) in Nordic material.

Habitat. Corticolous, on solitary, deciduous trees in open situations, often with nutrient-enriched bark.

Distribution. Very rare with a southern distribution in Scandinavia, known only from a few localities in Norway and Sweden. **N:** Ro Ho. **S:** Gtl Bh. Otherwise known from British Isles, Central and South Europe.

Note. Characterized by the small size, the closely adnate thallus, the small soralia and the filiform conidia. Diminutive forms of *Phaeophyscia orbicularis* has always abundant rhizinae.

Phaeophyscia

R. Moberg

Phaeophyscia Moberg

Symb. Bot. Ups. 22(1): 29 (1977). – TYPE: *Phaeophyscia orbicularis* (Neck.) Moberg

Literature: Moberg, Symb. Bot. Ups. 22(1) (1977); Moberg & Hansen, Meddr Grønland, Bioscience (1986).

THALLUS foliose, lobate with discrete or weakly overlapping lobes, more or less closely adnate or sometimes subfruticose, grey brown to dark brown, rarely greenish, without pruina. Upper and lower cortex paraplectenchymatous (all Nordic species), the cells in the lower cortex mostly with dark cell walls. APOTHECIA lecanorine, laminal, shortly stalked with a collar of rhizinae on the underside (corona), disk brown to black. Asci cylindrical, 8-spored; paraphyses with brown, thickened and weakly branched tips. Spores 1-septate, brown. CONIDIOMATA ± common, laminal, immersed except for the brown tips; conidia ellipsoid, less than 4 µm long. PHOTOBIONT *Trebouxia*.

Chemistry. Sometimes with skyrin (orange to red), without atranorin.

Note. The genus is separated from *Physcia* by the brownish colour, collar of rhizinae (corona) on the underside of apothecia, the dark underside with paraplectenchymatous cortex, ellipsoid conidia, and chemically by the absence (K–) of atranorin as major substance.

- 1 Without soralia or isidia 2
- With soralia or isidia 4
- 2 Lobes narrow and ascending, underside pale with few pale rhizinae. Apothecia rare. On calcareous ground among mosses 2. *P. constipata*
- Lobes ± adnate. Underside dark brown to black with abundant rhizinae. Corticolous or saxicolous 3
- 3 Corticolous. Medulla white 1. *P. ciliata*
- Saxicolous. Medulla usually orange to red 3. *P. endococcina*
- 4 With soralia, no isidia 5
- With isidia or isidiate soralia 6
- 5 Soralia marginal and lip-shaped, rarely laminal. Medulla red to orange. Apothecia rare 4. *P. endophoenicea*
- Soralia mainly laminal and capitate. Medulla white. Apothecia ± common 7. *P. orbicularis*
- 6 Thallus small (to 1 cm). Lobes narrow (to 1 mm) and ascending. Lower side pale 6. *P. nigricans*
- Thallus larger. Lobes broader and not ascending. Lower side black 7
- 7. Isidia usually developing into ciliate lobules. Lobes usually more than 1 mm broad, with abundant rhizinae projecting beyond margins. Local 5. *P. kairamoi*
- Isidia not so. Lobes less than 1 mm broad, rhizinae rarely projecting beyond margins 8. *P. sciastra*

1. *Phaeophyscia ciliata* (Hoffm.) Moberg

Symb. Bot. Ups. 22(1): 30 (1977). – *Lichen ciliatus* Hoffm., Enumeratio Lichenum: 69 (1784). – TYPE: Sweden, Södermanland, St. Malm, Brännkärr, 1909 or 1912 Malme, Lich. Succ. exs. no. 309 (UPS neotype, Moberg, Symb. Bot. Ups. 22(1): 30, 1977).

D: randtrådet rosetlav **F:** laakajäkälä **N:** osperosettlav **S:** aspkranslav.

Literature: Moberg, Symb. Bot. Ups. 22(1): 30 (1977).

Figs: Moberg & Holmåsén 1990: 197.

THALLUS orbicular, to 5 cm diam., sometimes irregular and confluent with other thalli forming larger patches, greyish brown to dark brown without pruina, ± closely adnate. Lobes radiating, to 1.5 mm broad, mostly flat, usually not overlapping. Soralia not present. Lower side black with black, abundant rhizinae ± projecting beyond lobe margins.

Medulla white. **APOTHECIA** abundant, very variable in size, to 3 mm diam., mostly with prominent corona of rhizinae on the underside. Spores (16–)20–24(–27) × (7–)9–12(–13) µm. **CONIDIOMATA** abundant.

Chemistry. No secondary substances (by TLC) in Nordic material.

Habitat. Primarily a corticolous species growing on ± smooth bark, especially *Populus tremula*, occasionally also found growing on rocks.

Distribution. Widely distributed in the area but more common in eastern or north-eastern parts. **D:** Sjø. **F:** A V U EK St EH ES LK EP PH PS PK KP Kn OP PeP Ks KiL SoL InL. **N:** Øf Ak He Op Bu Vf Te AA Ho SF MR ST NT SNo NNo Tr VFi. **S:** Klm SmI Bh Dls Ög Nrk Srm Vrm Vsm Upl Dlr Gst Hls Mpd Ång Hrj Jmt Vb Nb ÅsL LL. Otherwise a circumboreal to temperate species known from Europe, N. America and Asia.

Note. Characterized by the equally wide, elongate lobes, non-sorediate thallus with abundant apothecia having a distinct 'corona'.

2. *Phaeophyscia constipata* (Norrl. & Nyl.) Moberg

Symb. Bot. Ups. 22(1): 33 (1977). – *Physcia constipata* Norrl. & Nyl., Herb. Lich. Fenn. no. 218 (1882). – TYPE: Russia, Karelia onegensis, Walkeamäki (Belaya Gora), 1870 Norrlin (H-NYL 31949 lectotype, Moberg, Symb. Bot. Ups. 22(1): 33, 1977).

D: kalk-rosetlav **F:** pohjanlaakajäkälä **I:** stripamóra **N:** kalkrosettlav **S:** kalkkranslav

Redlisted in: **F I S**

Literature: Moberg, Symb. Bot. Ups. 22(1): 33 (1977).

THALLUS subfruticose or rarely foliose, always with a distinct upper and lower side, irregular, usually forming smaller or bigger tufts on the ground, greenish grey to brownish, often darker at the lobe tips (depending on the exposition). Lobes narrow, sparsely branched, ± erect, to 1 mm broad, margins ciliate by rhizinae, sometimes with hyaline hairs on the surface. Soralia and isidia absent. Lower side white to pale brownish, with few pale rhizinae, often with prominent greenish spots on the surface from clustered algal cells. Medulla white. **APOTHECIA** not common, to 2 mm diam. Spores mostly not well-developed (16–)18–21(–22) × (9–)10–11(–13) µm. **CONIDIOMATA** rare.

Chemistry. No secondary substances (by TLC) in Nordic material.

Habitat. Saxicolous, on bare rocks or, more often, among mosses on mainly calcareous, sun-exposed, well drained substrates.

Distribution. Rare species known from small areas in southern and northern Norway, southern and northern Sweden, northern Finland and Iceland. **Gr F:** Ks EnL InL. **I:** INo. **N:** Ak He Op Bu ST Tr VFi ØFi. **S:** NrK Vsm TL. Boreal and temperate regions of the Northern Hemisphere with ± continental climate, but always scattered.

Note. Characterized by the subfruticose thallus, the greenish colour, the narrow, erect lobes with ciliate margin, the white underside with green spots, and the terricolous growth habit.

3. *Phaeophyscia endococcina* (Körb.) Moberg

Symb. Bot. Ups. 22(1): 35 (1977). – *Parmelia endococcina* Körb., *Parerga Lichenol.*: 36 (1859). – Type: Italy, Tyrol, Botzen (Bolzano), Hausmann (L holotype).

D: fjeld-rosetlav **F:** kalliolaakajakälä **I:** klappamóra **N:** rødmarglav **S:** klippkranslav

Literature: Moberg, Symb. Bot. Ups. 22(1): 36 (1977).

Figs: Moberg & Holmåsén 1990: 198; Wirth 1995: 716.

THALLUS orbicular irregular to irregular, to 3 cm diam., usually less than 2 cm diam., firmly adnate, greyish brown to dark brown, ± shiny, without pruina. Lobes radiating, narrow, to 1 mm broad, mostly around 0.5 mm, ± convex to plane, usually distinctly separate. Neither soralia nor isidia present. Underside black with black, ± dense rhizinate, not or only slightly projecting beyond lobe-margins. Lower cortex paraplectenchymatous. Medulla mostly with orange to red pigment (skyrin), particularly in lower parts. APOTHECIA usually abundant in central parts of the thallus, sometimes sparse or lacking, to 1.5 mm diam., but usually less than 1 mm, margin often crenulate or lobulate, underside with corona of rhizinae. Spores 18–24 × 9–11 µm. CONIDIOMATA usually abundant.

Chemistry. Medulla K+ purple, ± skyrin, zeorin.

Habitat. Mainly saxicolous, growing both directly on rocks or on mosses on rocks, rarely on bark and lignum.

Distribution. Scattered distribution in Finland, Iceland,

Norway and Sweden. Not known from Denmark. **Gr F:** A V U EK St EH ES LK EP PH PS PK Kn OP PeP Ks KiL EnL InL. **I:** I Au INo. **N:** Øf Ak He Op Bu Te AA Ho SF MR ST SNo NNo Tr ØFi. **S:** Klm Bh Dls Ög NrK Srm Vrm Vsm UpI Dlr Gst Hls Mpd Ång Hrk Jmt Vb Nb ÅsL LyL PL TL. It is known from the boreal zone in Europe, North America, and Asia.

Note. Characterized by the firmly adnate thallus, the lack of soralia, the orange to red medulla, and the abundant apothecia.

4. *Phaeophyscia endophoenicea* (Harm.) Moberg

Symb. Bot. Ups. 22(1): 38 (1977). – *Physcia obscura* var. *endophoenicea* Harm., *Lich. France* 4: 645 (1909). – TYPE: France, Vosges, Le Roulier, 1909 Harmand (ANGUC holotype).

N: kystrødmarglav **S:** skuggkranslav

Literature: Symb. Bot. Ups. 22(1): 38 (1977).

Figs: Wirth 1987: 363; 1995: 717.

THALLUS irregular to sometimes orbicular, to 3 cm diam., sometimes confluent with other thalli to form bigger patches, closely adnate except for the lobe tips, grey brown to brown, dull to weakly shiny, without pruina. Lobes to 2 mm broad, with rounded, slightly broader tips. Soralia mainly terminal and labiate, occasionally laminal, often yellowish to reddish due to the exposed medulla. Lower side black with abundant black rhizinae. Medulla yellow to orange red through presence of skyrin in the lower part. APOTHECIA rare, seen only a few times. Spores 23–28 × 9–11 µm. CONIDIOMATA rare.

Chemistry. S kyrin (K+ purple) in the lower medulla.

Habitat. Corticolous, on bark of various deciduous trees, often *Acer*, in fairly shaded situations.

Distribution. Scattered in the southern parts of the Nordic area. Usually few individuals on each locality. **D:** ØJy Sjø. **N:** Ak Op Te AA VA Ro Ho MR. **S:** Hl Bh Vg Ög NrK Srm Vrm UpI. Mainly in temperate Europe.

Note. Characterized by ± irregular thallus shape, lip-shaped soralia, orange to red medulla, rarely fertile. *P. endophoenicea* is to some extent similar to *P. orbicularis*, but differs in type of soralia, constant presence of skyrin and partly also in the *Habitat*. The soralia in *P. endophoenicea* are in general labriform, skyrin is present in the lower medulla and it grows preferably in shaded situations. *P. orbicularis*

on the other hand has in general laminal, capitate soralia, rarely traces of skyrin in the medulla and prefers sunny, exposed habitats. *P. orbicularis* may sometimes (at exposed sites) become yellowish in the soralia and the upper cortex, but this colouration has no connection with a red medulla even though due to skyrin; skyrin probably develops secondarily on exposed soralia.

5. *Phaeophyscia kairamoi* (Vain.) Moberg

Symb. Bot. Ups. 22(1): 40 (1977). – *Physcia kairamoi* Vain., Meddeland. Soc. Fauna Fl. Fenn. 46: 3 (1921). – TYPE: Russia, Lapponia ponojensis, Orlov. 1889 Kihlman 298 (H lectotype, Moberg, Nordic Lichen Flora 2: 71, 2002).

D: tottet rosetlav **F:** otalaakajakälä **N:** skjellrosettjav **S:** raggkranslav

Redlisted in: **F**

Literature: Moberg, Symb. Bot. Ups. 22(1): 40 (1977).

Figs: Moberg 1969: pl. 1; 1997: 40.

THALLUS irregular, rarely orbicular, to 3 cm diam., often confluent and forming up to 10 cm large patches, marginal isidia/lobules often prominent giving the thallus a shaggy appearance, upper side grey brown to very dark brown, dull, with hyaline hairs on the surface which sometimes could be sparse and/or broken. Lobes very variable in size, to 4 mm wide but usually much narrower, broadest at the ± ascending lobe tips, margins mostly dissected in ciliate lobules or isidia, sometimes the lobules cover parts of the thallus. The isidia may occasionally become sorediate. Lower side black with black rhizinae often long and projecting beyond the margins. Medulla white. APOTHECIA fairly common, very variable in size and often irregular, to 3 mm diam., margins sometimes dissolved into isidia, corona ± prominent. Spores often poorly developed or overmature, (19–)22–27(–32) × (9–)10–12(–14) μm. CONIDIOMATA fairly common.

Chemistry. No secondary substances (by TLC) in Nordic material.

Habitat. Saxicolous or muscicolous, mainly on bare rocks or on mosses over calcareous rocks in southerly exposed situations in the mountains. Not recorded on trees in our area.

Distribution. Known from scattered localities in the central parts of the Scandinavian mountains, Svalbard and Greenland. **Gr F:** PK. **N:** He Op ST. **AI:** Sb. **S:** Hrj Vb?. Widespread in continental parts of boreal zone in Eurasia

and North America, also in Central Europe. In Asia and Canada often on trees.

Note. Characterized by irregular thallus, lobes with projecting rhizinae and marginal, ciliate isidia/lobules. The whole thallus appears shaggy.

6. *Phaeophyscia nigricans* (Flörke) Moberg

Symb. Bot. Ups. 22(1): 42 (1977). – *Lecanora nigricans* Flörke, Deutsche Lich. 5: 10 (1819). – TYPE: Germany (Berlin or Rostock) Flörke, Deutsche Lich. No. 91 (UPS lectotype, Moberg, Symb. Bot. Ups. 22(1): 42, 1977).

D: sortotigt rosetlav **F:** kääpiölaakajakälä **N:** svart rosettjav **S:** dvärgkranslav

Literature: Moberg, Symb. Bot. Ups. 22(1): 42 (1977).

Figs: Wirth 1987: 363; 1995: 717.

THALLUS very small, in tufts of c. 1 cm diam., sometimes growing together with other thalli to form irregular patches, subfruticose and loosely attached, grey brown to brown. Lobes narrow, less than 0.5 mm broad, ascending with isidia or isidious soredia on the margins. Lower side whitish to brown, never black, with few rhizinae. Medulla white. APOTHECIA not common, to 1 mm in diam., margins entire or with short lobules. Spores 17–22(–24) × 8–11 μm. CONIDIOMATA not common.

Chemistry. No secondary substances (by TLC) in Nordic material.

Habitat. Corticolous, mainly on lower parts of tree trunks, often dust-impregnated, in open situations. Also on mortar and ± calciferous rocks.

Distribution. Widespread in Denmark, the southern part of Finland and Sweden, rarer towards north and rare in Norway. **D:** NJy ØJy VJy Fyn Sjæ Brn. **Gr F:** A V U EK St EH ES EP PH PS PK KP Kn OP PeP Ks. **N:** Øf Ak He Op Bu Vf Te AA MR ST NT Tr. **AI:** Sb. **S:** Sk Bl ÖI Gtl Hl Bh Dls Vg Ög Nrk Srm Vrm Vsm Upl Dlr Gst Hls Mpd Ång Hrj Jmt Vb ÅsL LyL. Otherwise known from the rest of Europe and North America.

Note. Characterized by the small size, the ± fruticose appearance, the narrow lobes, the isidia becoming sorediate, the pale underside.

7. *Phaeophyscia orbicularis* (Neck.) Moberg

Symb. Bot. Ups. 22(1): 44 (1977). – *Lichen orbicularis* Neck., Delic. Gallo-Belg.: 509 (1768). – TYPE: France, Vendée, La Roche-sur-You, 1879 Richard (UPS neotype, Moberg, Symb. Bot. Ups. 22(1): 44, 1977).

D: grågrön rosettlav **F:** kehnålaakajakälä **I:** strandmóra **N:** grønn rosettlav **S:** kranslav

Literature: Moberg, Symb. Bot. Ups. 22(1): 44 (1977).

Figs: Moberg & Holmåsén 1990: 198; Wirth 1987: 363; 1995: 718–719.

THALLUS orbicular to irregular, to 3 cm diam., sometimes confluent with other thalli to form larger patches, ± closely attached, grey brown to dark brown, occasionally yellowish through formation of skyrin on the upper side (not in the medulla). Lobes radiating, overlapping or distinctly separate, to 1 mm broad, not ascending at tips. Soralia laminal, capitate to eroded, sometimes reaching the margins and then appearing marginal, occasionally spreading and covering larger areas of the thallus, white to yellowish. Lower side black with black rhizinae which rarely project beyond the margins. Medulla white. APOTHECIA ± abundant, to 1.5 mm diam., margins sometimes soredate. Spores 18–26 × 7–11 μm. CONIDIOMATA ± common.

Chemistry. Occasional traces of skyrin detected.

Habitat. Corticolous, mainly on trunks of deciduous trees, particularly *Populus tremula* in open situations. Favoured by dust impregnation. May also grow on basic rocks, concrete and bird-perch rocks.

Distribution. Common in the whole area except for the northernmost parts. **D:** NJy ØJy VJy SJy Fyn Sjæ Brn. **F:** A V U EK St EH ES LK EP PH PS PK KP Kn OP PeP Ks KiL SoL. **I:** IVe IAU INv. **N:** Øf Ak He Op Bu Vf Te AA VA Ro Ho SF MR ST NT SNo NNo Tr VFi ØFi. **S:** Sk Bl Öl Gtl Klm Sml Hl Bh Dls Vg Ög Nrk Srm Vrm Vsm Upl Dlr Gst Hls Mpd Ång Hrj Jmt Vb Nb ÅsL LyL PL LL TL. Otherwise known from Europe and North America.

Note. Characterized by adnate thallus, capitate soralia, ± richly fertile and corticolous *Habitat*. See also the discussion under *P. endophoenicea*.

8. *Phaeophyscia sciastra* (Ach.) Moberg

Symb. Bot. Ups. 22(1): 47 (1977). – *Parmelia sciastra* Ach., Methodus Suppl.: 49 (1803). – TYPE: Sweden (H-ACH 1354 lectotype, Moberg, Symb. Bot. Ups. 22(1): 47, 1977).

D: stift-rosettlav **F:** valulaakajakälä **I:** flagamóra **N:** stift-rosettlav **S:** mörk kranslav

Literature: Symb. Bot. Ups. 22(1): 47 (1977).

Figs: Moberg & Holmåsén 1990: 199.

THALLUS irregular, sometimes orbicular, to 5 cm but usually around 2 mm, firmly adnate, often confluent with other thalli forming larger patches, grey brown to dark brown usually appearing darker because of the presence of isidia. Lobes narrow, around 0.5 mm, rarely to 1 mm, sometimes imbricate. Isidia ± abundant, granular, marginal to laminal, sometimes soredia-like and covering patches of the lobes. Lower side black with black rhizinae. Medulla white. APOTHECIA ± common, to 3 mm diam. but usually smaller, margin sometimes crenulate or lobate. Spores (14–)16–20(–23) × (7–)8–10(–12) μm. CONIDIOMATA ± rare.

Chemistry. No lichen substances found.

Habitat. Saxicolous, mainly on acid rocks in open situations, favoured by seeping water and bird droppings. Also on old wood.

Distribution. Widespread and ± common in most parts of the area except for the southernmost parts. **D:** Brn. **Gr Fa F:** A V U EK St EH ES LK EP PH PS PK KP Kn OP PeP Ks KiL SoL EnL InL. **I:** ISu IVe IAU INv INo. **N:** Øf Ak He Op Bu Vf Te AA VA Ro Ho SF MR ST NT SNo NNo Tr VFi ØFi. **AI:** Sb. **S:** Sk Bl Öl Gtl Sml Hl Bh Dls Vg Ög Nrk Srm Vrm Vsm Upl Dlr Gst Hls Mpd Ång Hrj Jmt Vb Nb ÅsL LyL PL LL TL. One of the most widespread *Phaeophyscia* species in temperate and boreal areas and known from Europe, Africa, Asia, North and South America.

Note. Characterized by the small size, the narrow lobes, the isidia, the ± abundant apothecia. Easily recognized when isidia are present, but without isidia it could be very difficult to separate from sterile *P. endococcina*. Such specimens could be identified by TLC as zeorin is present in *P. endococcina*.

Phaeorrhiza

H. Mayrhofer & R. Moberg

Phaeorrhiza H. Mayrhofer & Poelt

Nova Hedwigia 30: 783 (1978). – TYPE: *Phaeorrhiza nimboza* (Fr.) H. Mayrhofer & Poelt

Literature: Mayrhofer & Poelt, Nova Hedwigia 30: 783–785

(1978); Hafellner, Mayrhofer & Poelt, *Herzogia* 5: 63–64 (1979); Rambold, Mayrhofer & Matzer, *Pl. Syst. Evol.* 192: 33–35 (1994).

THALLUS areolate in central part, lobate-squamulose to subfoliose at margins, adpressed to substrate, usually brown, often pruinose. Upper cortex paraplectenchymatous. Medulla colourless, of loosely intricated hyphae. Lower cortex indistinct or absent, consisting of brown, pseudoparen-chymatous interwoven hyphae, attached to the substrate with numerous dark brown rhizoidal hyphae arising from the lower cortex or directly from the lower medulla. **APOTHECIA** lecanorine or lecideine, often crowded. Hypothecium colourless. Asci of *Lecanora*-type, 8-spored. Spores 1-septate, brown, *Buellia*-type. **CONIDIOMATA** immersed, conidia bacilliform, $5\text{--}6 \times 1 \mu\text{m}$. **PHOTOBIONT** *Trebouxia*.

Chemistry. Variolaric acid, friedelin, zeorin.

Note. Characterized by the lobate-squamulose to subfoliose thallus, the presence of dark brown rhizoidal hyphae and the spores of *Buellia*-type.

- 1 Apothecia cryptolecanorine to lecanorine. Thallus lobate-squamulose.....*P. nimbosea*
– Apothecia lecideine. Thallus subfoliose.....*P. sareptana*

1. *Phaeorrhiza nimbosea* (Fr.) H. Mayrhofer & Poelt

Nova Hedwigia 30: 785 (1978). – *Parmelia nimbosea* Fr, *Lichenogr. Eur. Reform.*: 129 (1831). – *Rinodina nimbosea* (Fr.) Th. Fr., *Lichenogr. Scand.* 1: 193 (1871). – **TYPE:** Norway, Dovre, Blytt (UPS lectotype, Mayrhofer & Poelt, *Nova Hedwigia* 30: 785, 1978)

Syn. *Rinodina panschiana* Körb., *R. phaeocarpa* Vain., *Lecidea sagedioides* Nyl.

D: brun kalkjordslav

Literature: Magnusson, *Acta Horti Gothob.* 17: 327–331 (1947); Lamb, *Brit. Antarctic Surv. Scient. Reports* 61: 73–74 (1968); Mayrhofer & Poelt, *Nova Hedwigia* 30: 785–792 (1978); Huneck, Schmidt & Mayrhofer, *Herzogia* 8: 137–139 (1989); Rambold, Mayrhofer & Matzer, *Pl. Syst. Evol.* 192: 33–35 (1994).

THALLUS areolate in central parts, margins lobate-squamulose, adpressed to substrate, yellowish brown (shade) to dark brown, naked or more often pruinose. **APOTHECIA** crowded, to 1.5 mm diam., lecanorine, subimmersed in thallus-squamules, finally becoming sessile, often covering central part of thallus. Disc blackish brown to black, plane, sometimes pruinose. Hymenium 120–140 μm tall. Epihymenium red-brown. Hypothecium colourless, to 100 μm high. Spores *Buellia*-type, slightly constricted at the septum, torus weakly developed, $18\text{--}22 \times 8\text{--}10 \mu\text{m}$.

CONIDIOMATA rare, immersed, globose, conidia bacilliform, $5\text{--}6 \times 1 \mu\text{m}$.

Chemistry. All spot tests negative. Variolaric acid, friedelin, zeorin.

Habitat. Terricolous, on calcareous soil or muscicolous on decaying mosses and plant debris in alpine areas.

Distribution. Scattered in Greenland, Svalbard, Iceland, central and northern Norway and Sweden, rare in northern Finland. **Gr F:** EnL. **I:** IMi IAu INo. **N:** He Op Ho MR ST NNo Tr VFi ØFi. **AI:** Sb. **S:** Hrj Jmt ÅsL LyL PL LL TL. Otherwise known from the mountains of central and southern Europe, Siberia, Arctic Islands, Central Asia, Himalayas, North America and Antarctica.

Note. Characterized by the crowded, plane, lecanorine apothecia.

2. *Phaeorrhiza sareptana* (Tomin) H. Mayrhofer & Poelt

Nova Hedwigia 30: 792 (1978). – *Rinodina nimbosea* f. *sareptana* Tomin, *Notul. Syst. Inst. Cryptog. Horti Bot. Petropol. Reipubl. Ross.* 2: 80 (1923). – **TYPE:** Russia: Stalingrader Umgebung, Sarepta, 6.1926, Tomin 47 (UPS topotype).

Syn. *Rinodina sareptana* (Tomin) H. Magn.

Literature: Magnusson, *Acta Horti Gothob.* 17: 331–333 (1947); Mayrhofer & Poelt, *Nova Hedwigia* 30: 792–793 (1978).

THALLUS squamulose to subfoliose, forming convex rosulae, consisting of dense, contiguous or partly imbricate squamules, brown. Prothallus absent. **APOTHECIA** scattered or rare, 0.5–0.8 mm diam., lecideine, at first subimmersed then broadly attached. Disc convex, black. Hymenium 80–100 μm tall, oil droplets present, sparse. Epihymenium red brown. Hypothecium to 100 μm high, colourless. Spores *Buellia*-type, slightly constricted at the septum, torus weakly developed, $17\text{--}21 \times 8\text{--}9 \mu\text{m}$. **CONIDIOMATA** not observed.

Chemistry. No secondary substances (by TLC) in Nordic material.

Note. Characterized by the squamulose to subfoliose thallus and the lecideine convex apothecia.

var. **sareptana**

D: steppe-kalkjordslav

Habitat. Terricolous, on saline ground.

Distribution. Southern Russia and North America.

Note. Distinguished from var. *sphaerocarpa* by the eprui-nose thallus.

var. **sphaerocarpa** (Th.Fr.) H. Mayrhofer & Poelt

Nova Hedwigia 30: 793 (1978). – *Rinodina nimbose* var. *sphaerocarpa* Th. Fr. Lichenogr. Scand. 1: 193 (1871). – TYPE: Norway, Oppland, Wisted i Vaage (Visted in Vågå), 1863, Th. M. Fries (UPS lectotype, Mayrhofer & Poelt, Nova Hedwigia 30: 793, 1978).

Syn. *Buellia dovrensis* H. Magn.

Literature: Magnusson, Acta Horti Gothob. 17: 331 (1947); Lamb, Brit. Antarctic Surv. Scient. Reports 61: 73–74 (1968); Mayrhofer & Poelt, Nova Hedwigia 30: 793–796 (1978).

THALLUS subfoliose, yellowish brown to brown, pruinose. APOTHECIA abundant, to 1 mm diam., lecideine, sessile. Disc subglobose to convex. Hymenium 100–120 µm tall, faintly inspers. Epihymenium red-brown. Hypothecium colour-less. Spores *Buellia*-type, slightly constricted at the septum, torus weakly developed, 17–20 × 8–10 µm. CONIDIOMATA not seen.

Chemistry. Not tested.

Habitat. Terricolous, on calcareous soil or muscicolous on decaying mosses and plant debris in continental or alpine areas.

Distribution. Known only from Greenland and continental Norway. **Gr N:** *He Op.* Otherwise known from very few sites in central Europe, central Asia, North America and Antarctica.

Note. Characterized by the subfoliose thallus and the lecideine subglobose to convex apothecia.

Phycia

R. Moberg

Phycia (Schreb.) Michx

Fl. Bor.-Amer. 2: 326 (1803). – *Lichen* sect. *Phycia* Schreb., Gen. Pl. 2: 768 (1791). – TYPE: *Phycia tenella* (Scop.) DC. (lectotype, Thomson, Beih. Nova Hedwigia 7: 5, 1963).

Literature: Moberg, Symb. Bot. Ups. 22(1): 48–77 (1977).

THALLUS foliose, lobate with discrete or overlapping lobes, ± closely adnate, greyish, upper cortex paraplectenchy-

matous, lower cortex proso- or paraplectenchymatous, rhizinae simple. APOTHECIA lecanorine, laminal, sessile or shortly stipitate with brown to black disc with or without a whitish pruina. Asci cylindrical, 8-spored with brown, 1-septate spores of *Phycia*- or *Pachysporaria*-type, paraphyses branched, thickened and brown at tips. CONIDIOMATA immersed except for the dark ostiole, conidia subcylindrical, 4–6 µm. PHOTOBIONT *Trebouxia*.

Chemistry. Always atranorin, sometimes other terpenoids.

Note. Characterized by greyish colour, paraplectenchymatous upper cortex with K+ yellow reaction (atranorin), brown, 1-septate spores of *Phycia*- or *Pachysporaria*-type.

- | | | |
|----|---|--|
| 1 | Lobes with marginal cilia (not to be mistaken for projecting rhizinae) | 2 |
| – | Lobes without marginal cilia | 4 |
| 2 | Without soralia | 6. <i>P. leptalea</i> |
| – | With soralia | 3 |
| 3 | Soralia helmet-shaped | 1. <i>P. adscendens</i> |
| – | Soralia lip-shaped | 10. <i>P. tenella</i> |
| 4 | Without soralia | 5 |
| – | With soralia | 9 |
| 5 | Thallus densely pruinose. Spores narrowly ellipsoid, with distinct ornamentation | 7. <i>P. magnussonii</i> |
| – | Thallus not pruinose. Spores broadly ellipsoid, not distinctly ornamented | 6 |
| 6 | Medulla K+ yellow. Thallus mostly maculate | 7 |
| – | Medulla K–. Thallus rarely maculate | 9. <i>P. stellaris</i> |
| 7 | Saxicolous. Lobes mostly convex | 8. <i>P. phaea</i> |
| – | Corticulous. Lobes flat to concave | 8 |
| 8 | Apothecia extending to the lobe tips, small and crowded. Spores usually shorter than 22 µm long. Northern | 2. <i>P. aipolia</i> v. <i>alnophila</i> |
| – | Apothecia not so. Spores longer than 22 µm. Widespread .. | 2. <i>P. aipolia</i> v. <i>aipolia</i> |
| 9 | Medulla K+ yellow. Soralia capitate, rarely lipshaped | 3. <i>P. caesia</i> |
| – | Medulla K–. Soralia lip-shaped or marginal | 10 |
| 10 | Thallus distinctly pruinose. Soralia marginal | 4. <i>P. dimidiata</i> |
| – | Thallus epruinose. Soralia on lob-tips | 5. <i>P. dubia</i> |

1. Phycia adscendens H. Olivier *nom. cons.*

Fl. Lich. Orne 1: 79 (1882). –TYPE (CONS.): Sweden, Acharius (H-ACH 1428)

D: haette-rosetlav **F:** kauhalaakajakälä **I:** hjålmgåra **N:** hjelmlav **S:** hjålmsrosetlav

Literature: Moberg, Symb. Bot. Ups. 22(1): 50 (1977).

Figs: Moberg & Holmåsén 1990: 199; Wirth 1995: 727.

THALLUS to 2 cm diam., sometimes orbicular, mostly irregular with confluent thalli. Lobes broadest at tips, to 2 mm but usually around 1 mm and about 2–4 times as long. Marginal cilia present, pale to black, always black at the outer half. Upper side grey to dark grey, lobe tips mostly much darker, rarely with a white pruina. Soralia usually abundant, helmet-shaped, starting as openings just beneath the lobe tips, when older the upper cortex is sometimes broken through. Underside white to greyish, rhizinae sparse, white to black. APOTHECIA usually not common, shortly stipitate, to 2 mm diam., usually broader than the supporting lobe. Spores 16–23 × 7–10 µm. CONIDIOMATA sparse to abundant.

Chemistry. Upper cortex K+ yellow, medulla K–. Atranorin.

Habitat. Corticolous, prefers branches and trunks of deciduous trees (especially *Acer*, *Fraxinus*, *Populus*) in fairly exposed situations. May also grow on concrete and rocks in similar habitats. Northwards only in town and villages.

Distribution. Common in southern to central parts of the area, rare in the north and absent in the mountains. **D:** NJy ØJy VJy SJy Fyn Sjæ Brn. **Gr F:** A V U EK St EH ES LK EP PH PS PK KP Kn OP PeP Ks KiL SoL. **I:** IVe INv INo. **N:** Øf Ak He Op Bu Vf Te AA VA Ro Ho SF MR ST NT VFi ØFi. **S:** Sk Bl Öl Gtl Klm Sml HI Bh Dls Vg Ög Nrk Srm Vrm Vsm Upl Dlr Gst Hls Mpd Ång Hrij Jmt Vb Nb ÅsL. Otherwise known from temperate, boreal and corresponding areas in all continents and is more common at higher latitudes up to 65°N and 60°S. It is regarded as a "weedy" species probably spread by man.

Note. Characterized by the cilia on the lobe margins and the helmet shaped soralia. Its closest relative is *P. tenella* with lip-shaped soralia and they are separated mainly because of the soralia.

2. *Physcia aipolia* (Humb.) Fűrnr.

Naturhist. Topogr. Regensburg 2: 249 (1839). – *Lichen aipolius* Ehrh. ex Humb., Fl. Friberg.: 19 (1793). – TYPE: Germany, Hannover, Ehrh. Pl. Crypt. Linn. no. 197, ex herb. Smith (BM lectotype, Moberg, Symb. Bot. Ups. 22(1): 60, 1977).

D: hvitprikket rosettlav **F:** valkoolaakajäkälä **N:** vanlig rosettlav **S:** rosettlav

Literature: Moberg, Symb. Bot. Ups. 22(1): 60 (1977).

Figs: Moberg & Holmåsén 1990: 200; Wirth 1987: 369; 1995: 734.

THALLUS orbicular to irregular, to 10 cm diam., whitish grey to dark grey, rarely brownish grey, usually distinctly white-maculate, sometimes weakly white-pruinose. Lobes radiating, to 3 mm broad, flat to convex. Without soredia. Underside white to dark lead coloured or pale brown. APOTHECIA usually abundant, to 3 mm diam.. Disc fairly often white-pruinose. Spores (19–)21–25(–28) × 9–11(–13) µm. CONIDIOMATA common.

Chemistry. Cortex and medulla K+ yellow; atranorin and zeorin, rarely other triterpenes present.

var. *aipolia*

For differences from var. *alnophila* see below

Habitat. Corticolous, on trunks and branches of various deciduous trees, especially *Populus tremula*. Very rarely found on rock.

Distribution. Widely distributed within northern boreal, boreal and temperate vegetational zones. **D:** NJy ØJy VJy SJy Fyn Sjæ Brn. **Gr F:** A V U EK St EH ES LK EP PH PS PK KP Kn OP PeP Ks KiL SoL EnL InL. **N:** Øf Ak He Op Bu Vf Te AA VA Ro Ho SF MR ST NT SNo NNo Tr VFi ØFi. **S:** Sk Bl Öl Gtl Klm Sml HI Bh Dls Vg Ög Nrk Srm Vrm Vsm Upl Dlr Gst Hls Mpd Ång Hrij Jmt Vb Nb ÅsL LyL PL LL TL. Widespread in Eurasia, Africa, South America and North America.

Note. Characterized by the broad lobes, the white-maculate upper side, the lack of soredia, the abundant apothecia, the K+ yellow cortex and medulla and the corticolous *Habitat*.

var. *alnophila* (Vain.) Lyngé

Vid.-Selsk. Skrifter I. Mat.-Naturv. Kl. 8: 34 (1916). – *Physcia aipolia* f. *alnophila* Vain., Medd. Soc. Fauna Fl. Fenn. 6: 136 (1881). – Type: Finland, Inari, Veskonniemi, 1878 Vainio (TUR-V 8070 lectotype, Moberg, Symb. Bot. Ups. 22(1): 62 (1977).

Figs: Moberg, Symb. Bot. Ups. 22(1): 62 (1977).

THALLUS orbicular, to 4 cm diam. with narrow lobes (c. 1 mm). APOTHECIA very abundant, often crowded and reaching the very lobe tips, with convex, ± pruinose disc. Spores 16–22(–24) × 7–10 µm. CONIDIOMATA common.

Habitat. Corticolous, on trunks and branches of various deciduous trees, especially *Alnus incana*, *Salix* spp. and *Sorbus aucuparia*.

Distribution. Mainly restricted to higher altitudes or to the northern part of Fennoscandia. **F:** EP PH PS PK KP Kn OP PeP Ks KiL SoL EnL InL. **N:** Op Bu SNo VFi ØFi. **S:** Ög Upl Dlr Hls Mpd Ång Hrj Jmt Vb ÅsL LL TL. Otherwise known from northern Eurasia and northern North America.

Note. Characterized by the small thallus, the narrow lobes, the constantly abundant, small and crowded apothecia, the smaller spores and the substrate preference.

3. *Physcia caesia* (Hoffm.) Fűrnr.

Flora Ratisbonensis. Naturhistorische Topographie von Regensburg 2: 250 (1839). – *Lichen caesius* Hoffm., Enum. Lich.: 65 (1784). – TYPE: Austria, Tyrol, Gschnitzbach, Steinach, 1957 Steiner, Crypt. Exs. Mus. Vind. no. 4139 (UPS neotype, Moberg, Symb. Bot. Ups. 22(1): 64, 1977).

Syn. *Physcia subalbinea* Nyl., *P. wainioi* Räsänen

D: blågrå rosettlav **F:** sinilaakajakälä **I:** klappagråma **N:** hoderosetttlav **S:** stoftlav

Literature: Moberg, Symb. Bot. Ups. 22(1): 64 (1977).

Figs: Moberg & Holmåsén 1990: 200; Wirth 1995: 731.

THALLUS orbicular to irregular, grey to dark grey with white-maculate upper side. Lobes to 3 mm broad, usually narrower, sometimes overlapping, sometimes distinctly separated. Soralia marginal to "laminal", often capitate. The "laminal" soralia are not truly laminal but have started as marginal and grown inwards, still in contact with the lobe margin. Lower side white to dark grey with dark, sometimes black rhizinae. APOTHECIA sometimes present, sessile, to 2 mm diam. Spores 17–24 × 7–11 µm. CONIDIOMATA ± common.

Chemistry. Upper cortex and medulla K+ yellow. Atranorin and zeorin present, sometimes also some unidentified triterpenes.

Habitat. Saxicolous, mainly on rocks but, also on trunks, lignum, tiles and mortar. The rocky substrate could be both purely acidic but, the species also seems to be favoured by droppings from birds.

Distribution. Widely distributed in the whole area. **D:** NJy ØJy Fyn Sjæ Brn. **Gr F:** A V U EK St EH ES LK EP PH PS PK KP Kn OP PeP Ks KiL SoL EnL InL. **I:** ISu IVe

IMi IAu INv INo. **N:** Øf Ak He Op Bu Vf Te AA VA Ro Ho SF MR ST NT SNo NNo Tr VFi ØFi. **AI:** Sb. **S:** Sk BI ÖL Gtl Klm SmI HI Bh Dls Vg Ög Nrk Srm Vrm Vsm Upl Dlr Gst Hls Mpd Ång Hrj Jmt Vb Nb ÅsL LyL PL LL TL. Otherwise known from the rest of Europe, Africa, America and Asia.

Note. Characterized by the maculation on the upper side and the type of soralia, capitate or almost crateriform.

4. *Physcia dimidiata* (Arnold) Nyl.

Flora 64: 537 (1881). – *Parmelia pulverulenta* var. *dimidiata* Arnold, Flora 47: 594 (1864). – TYPE: [Germany, Bayern] Eichstätt, Arnold, Lich. Exs. no. 272 (M lectotype, Moberg, Nordic Lichen Flora 2: 71, 2002).

Syn. *Physcia dimidiata* var. *ornata* (Nádv.) Moberg

N: grynrosettlav

Redlisted in: **D.**

Literature: Moberg, Symb. Bot. Ups. 22(1): 74 (1977).

Figs: Wirth 1995: 728.

THALLUS irregular or rarely orbicular, to 3 cm diam. or larger when confluent with other thalli, loosely attached, grey to bluish grey or dark grey mostly with a dense crystalline pruina. Lobes to 2 mm broad, usually around 1 mm, with crenulate tips. Soralia marginal, less frequent on outer lobes, sometimes becoming laminal and covering central parts, soredia usually granular. APOTHECIA and CONIDIOMATA not seen in Nordic material.

Chemistry. Cortex K+ yellow, medulla K–. Atranorin.

Habitat. Saxicolous, on calcareous rocks in open, often sun-exposed places. Restricted to climatically arid valleys in Norway.

Distribution. Known from a few scattered localities in Central Norway which are outliers of its Central European *Distribution.* **N:** Op Bu SF ST.

Note. Norwegian material characterized by the narrow lobes with crenulate tips and the dense crystalline pruina. Var. *ornata* was separated from var. *dimidiata* mainly by the narrower lobes with crenulate lobe tips, but studies of material outside the area does not support a taxonomical subdivision of the species. Separated from *P. dubia* by the distinctly pruinose thallus, the marginal soralia and the crenulate tips.

5. *Physcia dubia* (Hoffm.) Lettau

Hedwigia 52: 254 (1912). – *Lobaria dubia* Hoffm., Deutschlands Flora: 156 (1796). – TYPE: Germany, Ehingen. 1897 Rieber, Arnold Lich. exs. n 1724 (UPS neotype, Moberg, Symb. Bot. Ups. 22(1): 76, 1977).

Syn. *Physcia intermedia* Vain., *P. teretiuscula* (Ach.) Lyngé, *P. wahlenbergii* Lyngé, *P. lyngéi* Nád., *P. tribacia* s. auct. (not *P. tribacia* (Ach.) Nyl.).

D: fuglestein-rosetlav **F:** seinälaakajakälä **I:** fuglagråma **N:** fuglesteinlav **S:** mångformigt rosettlav

Literature: Moberg, Symb. Bot. Ups. 22(1): 76 (1977).

Figs: Moberg & Holmåsén 1990: 201; Wirth 1987: 369; 1995: 733.

THALLUS irregular or rarely orbicular, to 5 cm diam., often larger because of confluent thalli, ± loosely adnate, white-grey to dark grey, occasionally with a pruina. Lobes sometimes much elongated, narrow (<1 mm) and distinctly separate, sometimes short, broad and ascending. Soralia marginal, mostly at the lobe tips and lip-shaped, occasionally entirely laminal. APOTHECIA uncommon, to 2 mm diam., usually with sorediate margins. Spores 16–24(–28) × 6–10 µm. CONIDIOMATA rare.

Chemistry. Cortex K+ yellow, medulla K–. Atranorin.

Habitat. Mainly epilithic on both acidic and basic rocks but also often found on trunks, lignum and tiles. One of the characteristic species found on rocks visited by birds and other nitrogen-rich habitats along shores and human habitations. Also on calcareous cliffs.

Distribution. Common in the whole area. **D:** NJy ØJy SJy Fyn Sjæ Brn. **Gr Fa F:** A V U EK St EH ES LK EP PH PS PK KP Kn OP PeP Ks KiL SoL EnL InL. **I:** ISu IVe IMi I Au INv INo. **N:** Øf Ak He Op Bu Vf Te AA VA Ro Ho SF MR ST NT SNo NNo Tr VFi ØFi. **AI:** Bi Sb. **S:** Sk Bl ÖI Gtl Klm Sml Hl Bh Dls Vg Ög Nrk Srm Vrm Vsm Upl Dlr Gst Hls Mpd Ång Hvj Jmt Vb Nb ÅsL LyL PL LL TL. Also known from rest of Europe, Africa, North and South America, and Asia.

Note. Characterized by the sorediate, usually non-pruinose thallus with K negative medulla. A very variable species and certain modifications have been recognized as separate taxa as *P. intermedia* and *P. teretiuscula*.

6. *Physcia leptalea* (Ach.) DC.

in Lamarck & deCandolle, Fl. Franç. ed. 3, 2: 395 (1805). – *Lichen*

leptaleus Ach., Lichenogr. Suec. Prodr.: 108 (1799 "1798"). – TYPE (cons.): Scotland, Perthshire, Killin, Crombie, Lich. Brit. Exs. No 151 (UPS).

Lichen semipinnatus J.F. Gmel. (*Physcia semipinnata* (Gmelin) Moberg) nom. utique rejic., s. auct.

D: småfliget rosetlav **F:** ripsilaakajakälä **N:** kystrosettlav **S:** fransrosettlav

Redlisted in: **F S**.

Literature: Moberg, Symb. Bot. Ups. 22(1): 56 (1977).

Figs: Moberg & Holmåsén 1990: 201; Thor & Arvidsson 1999: 306.

THALLUS orbicular to irregular, to 4 cm diam, sometimes confluent with other thalli forming bigger patches, loosely attached. Upper side whitish grey to grey, rarely dark grey, often white-spotted, without pruina. Lobes mostly long and narrow, to 1 mm wide, sometimes shorter and broader, to 2 mm wide, margins with long, thallus-coloured cilia, lobe tips not ascending. Soralia absent. Underside pale grey to brownish, rhizinae few, somewhat darker than the underside. APOTHECIA common, shortly stipitate, to 3 mm diam. Spores 17–22 × 7–10 µm. CONIDIOMATA sometimes abundant.

Chemistry. Upper cortex K+ yellow, medulla K–. Atra-norin.

Habitat. Corticolous, on various deciduous trees, mainly the trunk, in fairly open situations as e.g. avenue trees. It seems to have preference for coastal areas in Norden.

Distribution. Southerly distributed in Finland (very rare), Norway and Sweden, scattered but rare in Denmark. **D:** NJy ØJy VJy Sjæ Brn. **F:** A V U. **N:** Øf Vf VA Ro Ho. **S:** Gtl Bh Dls Vg Srm Upl. Otherwise known from Central and South Europe.

Note. Characterized by the ciliate lobe-margins, the abundant apothecia and the more robust appearance when compared with *P. adscendens* and *P. tenella*.

7. *Physcia magnussonii* Frey

Ergebn. Wissen. Unters. Schweizer. Nationalparks N.F. 3 (27): 480 (1952). – TYPE: Switzerland, Graubünden, Münstertal, Rhatien, Umbrailpass, 1927 E. Frey 164 (G lectotype, Moberg, Symb. Bot. Ups. 22(1): 68, 1977).

D: hvidgrå rosetlav **F:** laakajakälä **N:** rimrosettlav **S:** pudrad rosettlav

Redlisted in: **S**

Literature: Moberg, Symb. Bot. Ups. 22(1): 68 (1977).

Figs: Wirth 1987: 370; 1995: 725.

THALLUS usually orbicular, to 8 cm diam., sometimes confluent with other thalli, greyish, often with a brownish tinge, mostly with a dense pruina, \pm loosely adnate. Lobes radiating, to 3 mm broad, \pm convex, mostly overlapping. Without soredia. Underside whitish with a pinkish tinge or pale brown, rhizinae few but prominent. APOTHECIA usually abundant, to 3 mm diam. Disc mostly white-pruinose. Spores narrowly ellipsoid, surface with a distinct ornamentation (well-developed spores), $16\text{--}24 \times 6\text{--}9 \mu\text{m}$. CONIDIOMATA common.

Chemistry. Cortex K⁺ yellow, medulla \pm rose-coloured with K. Atranorin.

Habitat. Saxicolous, mainly on acidic rocks in warm and sun-exposed situations.

Distribution. Rare species with scattered localities in Central Sweden and Norway. **Gr N:** Op SF MR ST NT. **S:** Ög Upl Dlr Jmt. Also known from Central and South Europe.

Note. Characterized by the dense pruina, the broad lobes, the absence of soredia, the abundant apothecia and the narrowly ellipsoid, distinctly ornamented spores.

8. *Physcia phaea* (Tuck.) J.W. Thomson

Beih. Nova Hedwigia 7: 54 (1963). – *Parmelia phaea* Tuck. ex E. Michener in Darlington, Flora Cestricea, ed. 3: 440 (1853). – TYPE: USA, Pennsylvania, Chester, 1852 Michener (FH-Tuck. 840 holotype).

Syn. *Physcia melops* Duf. ex Nyl.

D: klippe-rosettlav **F:** kaitalaakajakälä **N:** steinrosettlav **S:** rikfruktig rosettlav

Redlisted in: **F S**

Literature: Moberg, Symb. Bot. Ups. 22(1): 66 (1977).

THALLUS orbicular to irregular, to 5 cm across, often confluent with other thalli, \pm closely appressed, grey to dark grey or brownish grey, usually strongly maculate. Lobes radiating, flat to convex, distinctly separated or \pm imbricate, to 2 mm wide but usually around 1 mm. APOTHECIA usually very abundant, to 2 mm across but mostly around 1 mm, when young often with crenulate margins, occasionally

covered with a white pruina. Spores (15–)16.5–20(–21.5) \times (6.5–)7–9.5(–11) μm . CONIDIOMATA numerous.

Chemistry. Upper cortex and medulla K⁺ yellow. Atranorin, zeorin and occasionally some other triterpenes.

Habitat. Saxicolous, on acid rocks in open situations, some-times weakly influenced by bird droppings.

Distribution. Fairly abundant in Dovre area in Norway though very rare in Finland and Sweden. **Gr F:** EH PS PeP. **N:** Ak He Op Bu MR ST NT. **S:** Vg Ög Jmt. Otherwise known from the Alps, Russia and North America.

Note. Characterized by the \pm convex, strongly maculate lobes, the non-sorediate thallus and the abundant apothecia.

9. *Physcia stellaris* (L.) Nyl.

Actes Soc. Linn. Bordeaux 21: 307 (1857). – *Lichen stellaris* L., Sp. Pl.: 1144 (1753). – TYPE: Without locality (LINN 1273:81 lectotype, Howe, Bull. Torrey Bot. Club 39: 201, 1912).

D: stjernformet rosettlav **F:** tähtilaakajakälä **I:** stjernugråma **N:** stjernerosettlav **S:** stjärnlav

Redlisted in: **D**

Literature: Moberg, Symb. Bot. Ups. 22(1): 71 (1977).

Figs: Moberg & Holmåsén 1990: 202; Wirth 1987: 369, 370; 1995: 727, 734.

THALLUS orbicular or irregular, to 5 cm diam., rarely con-fluent with other thalli, loosely adnate to substrate, cream-whitish grey to dark grey, mostly without pruina and maculation. Lobes radiating, very variable in width (to 3 mm) but mostly c. 1 mm or narrower. Soralia not present. APOTHECIA usually abundant, \pm stalked, very variable in size in one and the same thallus, to 4 mm diam. Disc often pruinose. Spores (14–)17.5–22.5(–28) \times (6.5–)8–10(–12) μm . CONIDIOMATA \pm abundant.

Chemistry. Cortex K⁺ yellow, medulla K[–]. Atranorin.

Habitat. Corticolous, on trunks and branches of various deciduous trees, eventually with some preference for *Populus tremula*, very rarely on stones.

Distribution. Widely distributed in the Nordic countries but more common in the northern parts. **D:** NJy ØJy Fyn Sjæ Brn. **F:** A V U EK St EH ES LK EP PH PS PK KP Kn OP PeP Ks KiL SoL EnL InL. **I:** ISu. **N:** Øf Ak He Op Bu Vf

Te AA VA Ro Ho SF MR ST NT SNo NNo Tr VFi. **S:** Sk Bl ÖI Gtl Klm SmI HI Bh Dls Vg Ög Nrk Srm Vrm Vsm Upl Dlr Hls Ång Hlj Jmt Vb ÅsL LyL LL TL. Otherwise known from arctic, boreal and temperate vegetational zones in Eurasia and North America. Also in Africa, South America and Australia.

Note. Characterized by the narrow lobes, the weakly creamy grey colour, the lack of distinct maculae, the abundant apothecia, very variable size in one and the same thallus, the K– medulla and the corticolous habitat.

10. *Physcia tenella* (Scop.) DC. nom. cons.

in Lamarck & De Candolle, Fl. Franç., ed. 3, 2: 396 (1805). – *Lichen tenellus* Scop., Fl. Carniol., ed. 2, 2: 394 (1772). – TYPE (cons.): Czech Republic, Moravia, Mor. Herálec, 1942 Nádvořník, Phyc. Exs. No. 8 (UPS).

Syn. *Physcia subobscura* Nyl., *P. tenella* var. *marina* (A.Nyl.) Lyngé, *P. tenella* ssp. *marina* (A. Nyl.) D. Hawksw.

D: spad-rosetlav **F:** hentolaakajakälä, merilaakajakälä **I:** strandgråma **N:** frynserosettlav **S:** finlav.

Literature: Moberg, Symb. Bot. Ups. 22(1): 53 (1977).

Figs: Moberg & Holmäsén 1990: 202; Wirth 1987: 370; 1995: 727.

THALLUS orbicular to irregular, to 3 cm diam., often confluent with other thalli forming larger patches, loosely attached. Upper side whitish grey to brownish or blackish (on seashores), without pruina. Lobes ascending, narrow, to 1 mm, the tips to 2 mm, margins provided with grey to (mainly at tips) black cilia. Soralia terminal labiate, usually causing the lobe tip widen. Underside white to brownish with few white to black rhizinae. APOTHECIA not uncommon, shortly stipitate, to 2 mm diam. Spores 17–21 × 7–10 µm. CONIDIOMATA sparse to abundant.

Chemistry. Upper cortex K+ yellow. Atranorin.

Habitat. Corticolous or saxicolous, on branches and trunks of various deciduous trees; rocks and wooden structures on the seashore.

Distribution. Widely distributed in Norden except for the northernmost parts. **D:** NJy ØJy VJy Fyn Sjæ Brn. **Gr F:** A V U EK St EH ES LK EP PH PS PK KP Kn OP PeP Ks. **I:** ISu IVE IAu INv INo. **N:** Øf Ak He Op Bu Vf Te AA VA Ro Ho SF MR ST NT SNo NNo Tr VFi ØFi. **S:** Sk Bl ÖI Gtl Klm SmI HI Bh Dls Vg Ög Nrk Srm Vrm Vsm

Upl Dlr Gst Hls Mpd Ång Vb ÅsL LyL. Otherwise known from the rest of Europe and in N. America.

Note. *P. tenella* is characterized by the ciliate margins and the lip-shaped, terminal soralia. Specimens growing in maritime habitats have been separated as var. *marina*, but I regard this material as a habitat-induced modification.

Physconia

R. Moberg

Physconia Poelt

Nova Hedwigia 9: 30 (1965). – TYPE (cons.): *Physconia pulverulacea* Moberg [= *P. distorta* (With.) J.R. Laundon]

Literature: Moberg, Symb. Bot. Ups. 22(1): 80–98 (1977); Vitikainen, Ann. Bot. Fenn. 5: 1–9 (1968).

THALLUS foliose, lobate with discrete or weakly overlapping lobes, ± closely adnate, various shades of brown, often white-pruinose; lower side black to pale brownish. Upper cortex thick, scleroplectenchymatous or paraplectenchymatous; lower cortex dark brown, sometimes pale or missing in parts, prosoplectenchymatous, rhizinae mostly squarrose, rarely simple. APOTHECIA lecanorine, often with lobulate margins, spores *Physconia*-type (see *Rinodina*), paraphyses with brown, dichotomously branched and thickened tips. CONIDIOMATA immersed except for the ostiole, conidia subcylindrical, more than 6–8 µm long. PHOTOBIONT *Trebouxia* and/or *Pseudotrebouxia*.

Chemistry. Some unidentified substances present in some species.

Note. Characterized by the sclero- to paraplectenchymatous upper cortex, the squarrose rhizinae and the pruinose upper side.

- | | |
|--|---------------------------|
| 1 Rhizinae simple..... | 4. <i>P. grisea</i> |
| – Rhizinae squarrose..... | 2 |
| 2 Without soralia..... | 3 |
| – With soralia..... | 4 |
| 3 Terricolous or on mossy rocks..... | 5. <i>P. muscigena</i> |
| – Corticolous, very rarely on other substrate..... | 2. <i>P. distorta</i> |
| 4 Soralia lip-shaped. Underside of lobe tips mostly without cortex (thus white)..... | 6. <i>P. perisidiosa</i> |
| – Soralia marginal. Underside of lobe tips with cortex..... | 5 |
| 5 Medulla and soralia yellowish, K+ distinctly yellow..... | 3. <i>P. enteroxantha</i> |
| – Medulla and soralia white, K–..... | 1. <i>P. deterosa</i> |

1. Physconia detersa (Nyl.) Poelt

Nova Hedwigia 9: 30 (1965). – *Parmelia pulverulenta* var. *detersa* Nyl., Syn. Meth. Lich. 1(2): 420 (1860). – TYPE: "Finlandia orient.", Nylander (H-NYL 32402 lectotype, Poelt, Nova Hedwigia 12: 124, 1966).

D: brun dugrosetlav **F:** idänlaakajakälä **N:** brundogglav
S: nordlig dagglav

Literature: Moberg, Symb. Bot. Ups. 22(1): 81 (1977).

THALLUS orbicular to irregular, to 6 cm diam., ± loosely adnate, grey-brown to dark brown, ± shiny, occasionally with a white or bluish pruina. Lobes elongate, to 3 mm broad, separate or overlapping. Soralia marginal, rarely at the lobe tips, usually with a bluish colour. Underside black, or brown at the lobe tips, rhizinae abundant, squarrose. Upper cortex well-developed, scleroplectenchymatous; medulla white; lower cortex well-developed, prosoplectenchymatous. APOTHECIA rare, margins sorediate, to 3 mm diam. Spores 27–32 × (13–)16–20 μm. CONIDIOMATA rare.

Chemistry. No secondary substances (by TLC) in Nordic material.

Habitat. Saxicolous, on mossy, mostly basic rocks on steep slopes or less frequently on trunks of *Sorbus*, *Acer* and other trees in parks and villages.

Distribution. Rare in Norway and northern Sweden, more common in the southeastern part of Finland. Absent in Denmark and southern Sweden. **Gr F:** U EK St EH ES LK EP PH PS PK Kn PeP Ks KiL EnL InL. **N:** He Op Bu SNo NNo VFi ØFi. **S:** Hrj Jmt Vb Nb LyL PL LL TL. Otherwise known from Central Europe and North America.

Note. Characterized by the ± shiny brownish colour, the bluish pruina, the marginal soralia, and the white medulla.

2. Physconia distorta (With.) J.R. Laundon

Lichenologist 16: 218 (1984). – *Lichen distortus* With., Bot. Arr. Veg. Gr. Brit. 1: 711 (1776). – TYPE: Dillenius, Hist. Musc.: t. 24, 72A (1742), (lectotype, Laundon, Lichenologist 16: 218, 1984); without locality, corresponding specimen in herb. Dillenius (OXF epitype, Moberg, Nordic Lichen Flora 2: 71, 2002).

Syn. *Physconia pulverulacea* Moberg, *P. pulverulenta* auct.

D: pudret dugrosetlav **F:** härmälaakajakälä **N:** skåldogglav
S: dagglav

Literature: Moberg, Symb. Bot. Ups. 22(1): 93 (1977).

Figs: Moberg & Holmäsén 1990: 205; Wirth 1987: 372; 1995: 737.

THALLUS orbicular to irregular, very variable in size, to 15 cm, inner parts sometimes bullate to verrucose, loosely adnate, grey brown to dark brown, usually covered with a ± dense, white pruina. Lobes radiating, to 4 mm wide, ± overlapping, inner lobes sometimes with lobules. Underside black, brown at the lobe tips, rhizinae abundant, squarrose. Upper cortex scleroplectenchymatous; lower cortex prosoplectenchymatous, mostly well-developed. APOTHECIA usually numerous, variable in size, to 5 mm diam., margins often with adventitious lobes. Spores (26–)27–37(–39) × (14–)15–19(–21) μm. CONIDIOMATA ± abundant.

Chemistry. No secondary substances (by TLC) in Nordic material.

Habitat. Corticolous, preferably on deciduous trees in open situations in the southern areas, e.g. solitary, wayside trees. In the north also on mossy rocks on steep slopes.

Distribution. Common in the southern parts, rare in the northernmost parts. **D:** NJy ØJy VJy SJy Fyn Sjä Brn. **F:** A V U EK St EH ES EP PH PS PK KP Kn OP PeP Ks. **N:** Øf Ak He Op Bu Vf Te AA VA Ro Ho SF MR ST NT SNo NNo Tr. **S:** Sk Bl Öl Gtl KlM SmI HI Bh Dls Vg Ög Nrk Srm Vrm Vsm Upl Dlr Gst Hls Mpd Ång Hrj Jmt Vb ÅsL LL. Otherwise known from the rest of Europe, East Africa and North America.

Note. Characterized by its large size, the broad-lobed, pruinose thallus, the absence of soralia, the scleroplectenchymatous upper cortex, and the abundant apothecia with secondary lobes.

3. Physconia enteroxantha (Nyl.) Poelt

Nova Hedwigia 12: 125 (1966). – *Physcia enteroxantha* Nyl., Flora 56: 196 (1873). – TYPE: France, Pyrénées-Orientales, Port Vendres (Portum Veneris), 1872 Nylander (H-NYL 32398 holotype).

D: grynet dugrosetlav **F:** pihlajanlaakajakälä **N:** pulverdogglav **S:** gulkantad dagglav

Literature: Moberg, Symb. Bot. Ups. 22(1): 84 (1977).

Figs: Moberg & Holmäsén 1990: 204; Wirth 1987: 373; 1995: 737.

THALLUS usually irregular, to 5 cm, often confluent with other thalli, ± closely adnate, grey-brown to dark brown,

usually with a white pruina. Lobes to 3 mm wide, \pm overlapping, rarely with ascending tips. Soralia marginal, rarely \pm lip-shaped, occasionally becoming laminal, yellowish. Underside brownish, sometimes blackish in inner parts, rhizinae abundant, squarrose. Upper cortex paraplectenchymatous, medulla yellowish, lower cortex prosoplectenchymatous. APOTHECIA rare, to 3 mm diam., margin usually with soralia. Spores (25–)28–37 \times 16–21 μ m. CONIDIOMATA rare.

Chemistry. Medulla K+ yellow. One unidentified substance detected by TLC.

Habitat. Corticolous, preferably on deciduous trees in open situations, e.g. solitary, wayside trees, in the southern areas. In the north also on mossy rocks.

Distribution. Common in the southern parts, rare in the northern parts. **D:** NJy ØJy VJy SJy Fyn Sjæ Brn. **Gr F:** A V U EK St EH ES LK EP PH PS PK KP OP PeP Ks KiL SoL EnL InL. **N:** Øf Ak He Op Bu Vf Te AA VA Ro Ho SF ST NT NNø Tr VFi ØFi. **S:** Sk Bl Öl Gtl Klm Sml Hl Bh Dls Vg Ög Nrk Srm Vrm Vsm Upl Dlr Gst Hls Mpd Ång Hrj Jmt Vb ÅsL LyL LL TL. Otherwise common in the rest of Europe. Also present in North America.

Note. Characterized by the yellowish, marginal soralia, the yellowish medulla, and the corticate, pale lobe tips.

4. *Physconia grisea* (Lam.) Poelt

Nova Hedwigia 9: 30 (1965). – *Lichen griseus* Lam., Encycl. 3: 480 (1792). – TYPE: France, Paris?, "in truncis arborum" (P-LA holotype).

D: hvidgrå dugrosetlav **F:** laakajakälä **N:** grådogglav **S:** gryinig dagglav

Literature: Moberg, Symb. Bot. Ups. 22(1): 96 (1977).

Figs: Moberg & Holmåsén 1990: 203; Wirth 1987: 373; 1995: 738.

THALLUS irregular to orbicular, to 8 cm, occasionally confluent with other thalli, closely adnate, greyish to brown, often covered with a white, maculate pruina. Lobes mostly overlapping, to 3 mm broad, broadest near the tips. Soredia granular, becoming isidiate, marginal or laminal, sometimes covering central parts. Underside whitish, in central parts pale brown, rhizinae simple or sparsely branched, white to blackish. Upper cortex paraplectenchymatous; medulla white; lower cortex prosoplectenchymatous, not distinctly separated from the medulla. APOTHECIA not common, to 3 mm, margins sorediate. Spores 27–34 \times 14–17 μ m. CONIDIOMATA rare.

Chemistry. All spot tests negative. Four unidentified lichen substances (different from other substances in the genus) detected by TLC.

Habitat. Corticolous, on various deciduous trees with nutrient-rich bark in open situations. May be found on rocks outside the area.

Distribution. Restricted to the southern parts of the area, not known from Finland and Iceland. **D:** NJy ØJy SJy Fyn Sjæ Brn. **N:** VA. **S:** Sk Bl Öl Gtl Hl Bh Vg Ög Upl. Otherwise known from Central and southern Europe and North Africa.

Note. Characterized by the greyish brown colour, the maculate pruina, the granulose soredia, and the pale underside with simple rhizinae.

5. *Physconia muscigena* (Ach.) Poelt

Nova Hedwigia 9: 30 (1965). – *Parmelia muscigena* Ach., Lichenographia universalis: 472 (1810). – TYPE: Switzerland "Helvetia" [probably Valais, Salvan Valley], Schleicher 58a (H-ACH 1406A lectotype, Moberg, Symb. Bot. Ups. 22(1): 88, 1977).

D: mos- dugrosetlav **F:** sammallaakajakälä **I:** mosarætla **N:** kalkdogglav **S:** mossdagglav

Literature: Moberg, Symb. Bot. Ups. 22(1): 88 (1977).

Figs: Moberg & Holmåsén 1990: 204; Wirth 1987: 375; 1995: 739.

THALLUS irregular, rarely orbicular, loosely adnate, to 5 cm, difficult to delimit as the thallus usually joins with other thalli, brown to dark brown, dull, usually covered with a \pm dense, white pruina. Lobes very variable in size, to 3 mm wide, marginal lobes broadest, the tips usually ascending, inner lobes narrower and ascending, often forming areas of densely crowded erect lobes. Underside brown to black, paler at the tips, rhizinae squarrose. Upper cortex para-plectenchymatous, medulla white, lower cortex proso-plectenchymatous. APOTHECIA \pm common, variable in size, to 5 mm diam., usually with marginal lobes. Spores 23–32(–35) \times 12–16 μ m. CONIDIOMATA \pm common.

Chemistry. No secondary substances (by TLC) in Nordic material.

Habitat. Terricolous, among mosses on the ground or on mossy rocks. Especially in forest regions, it is restricted to calcareous soil or bedrock.

Distribution. Mainly arctic and alpine with scattered lowland localities, locally common on Öland and Gotland. **Gr F:** A PS PK Kn PeP Ks KiL SoL EnL InL. **I:** IMi INv INo. **N:** Ak He Op Bu Te Ro Ho SF MR ST NT SNo NNo Tr VFi ØFi. **S:** Öl Gtl Ög Dlr Hrj Jmt Vb ÅsL LyL PL LL TL. Otherwise known from the Alps, East Africa (high altitude) and North America.

Note. Characterized by the habitat, the ascending lobes, and the ± abundant, lobate apothecia.

6. *Physconia perisidiosa* (Erichsen) Moberg

Symb. Bot. Ups. 22(1): 90 (1977). – *Physcia perisidiosa* Erichsen, Verh. Bot. Vereins Brandenburg 72: 57 (1930). – TYPE: Germany, Schleswig-Holstein, Kr. Lauenburg, Siebenbäume, Gut Castorf, 1916 Erichsen (HBG lectotype, Moberg, Symb. Bot. Ups. 22(1): 90 (1977).

D: liden dugrosetlav **F:** limilaakajakälä **I:** sneparætla **N:** leppedogglav **S:** fjällig dagglav

Literature: Moberg, Symb. Bot. Ups. 22(1): 90 (1977).

Figs: Moberg & Holmåsen 1990: 203; Wirth 1987: 375; 1995: 740.

THALLUS irregular to orbicular, to 4 cm, rarely more than 2 mm, usually confluent with other thalli, ± loosely adnate, brown to very dark brown, usually shiny, often covered with a white to bluish white, ± dense pruina. Lobes sometimes long (to 3 mm) and narrow, sometimes short and broad (to 1 mm), the short lobes usually ascending. Soralia marginal, lip-shaped, mainly delimited to the short ascending lobes, white to bluish grey, occasionally isidia-like in central parts. Underside dark brown in central parts but turning paler towards outer parts, ending up as brown hyphal sweeps leaving the outermost part of the underside white (without cortex). Upper cortex scleroplekten-chymatous, dense and hard, cells irregular with thick walls. Medulla white. Lower cortex prosoplectenchymatous, brown, not present at the lobe tips. APOTHECIA rare, margins not dissolving into soredia, occasionally lobate. Spores (24–)28–35 × 16–21 µm. CONIDIOMATA rare.

Chemistry. No secondary substances (by TLC) in Nordic material.

Habitat. Mainly corticolous on various deciduous trees with nutrient-rich bark, especially in parks, or on mossy, calcareous rocks in exposed situations (northern areas).

Distribution. Scattered to common throughout the area except for the western parts. **D:** NJy SJy Fyn Sjæ. **Gr F:**

A V U EK St EH ES LK EP PH PS PK KP Kn OP PeP Ks InL. **I:** ISu INv. **N:** Øf Ak He Op Bu Vf Te AA SF ST Tr VFi ØFi. **S:** Sk Bl Öl Gtl Sml Hl Bh Dls Vg NrK Srm Vrm Vsm Upl Dlr Gst Mpd Hrj Jmt Vb Nb ÅsL LyL PL LL TL. Otherwise known from the rest of Europe, East Africa and North and South America.

Note. Characterized by the small size, the narrow lobes, the lip-shaped, bluish soralia, and the lack of cortex on the underside of the lobe tips (only brown strips of hyphae).

Rinodina

H. Mayrhofer & R. Moberg

Rinodina (Ach.) Gray

Natural arrangement British Plants 1: 448 (1821). – *Lecanora* [unranked] *Rinodina* Ach., Lich. Univers.: 344 (1810). – TYPE: *Rinodina sophodes* (Ach.) A. Massal. (lectotype, Clements & Shear, Genera of Fungi: 323, 1931).

Literature: Magnusson, Acta Hort. Gothoburgensis 17: 191–338 (1947); Sheard, Lichenologist 3: 328–367 (1967); Mayrhofer & Poelt, Biblioth. Lichenol. 12: 1–186 (1979); Mayrhofer, J. Hattori Bot. Lab. 55: 327–493 (1984); Matzer & Mayrhofer, Bothalia 26: 11–30 (1996); Giralt, Biblioth. Lichenol. 79: 1–160 (2001).

Autonomous lichen, rarely lichenicolous. THALLUS evanescent to crustose, continuous to areolate or squamulose; areolae usually flat, surface smooth to verrucose or granulose, greyish to brown or sometimes dark brown. Prothallus sometime present, dark. APOTHECIA brown to black, rarely with a white pruina, variable in size, to 2 mm diam., immersed to sessile with constricted base. Thalline margin mostly prominent, lacking in a few species, cortex distinct, especially in corticolous and muscicolous taxa (I+ or I–), or lacking. Hymenium colourless, rarely with oil droplets. Epithymenium brown or rarely grey. Hypothecium colourless to rarely brown. Paraphyses 1–2 µm, simple or branched with swollen (to 6 µm) and often brown apices. Asci with 8(–16) spores, tholus mostly of *Lecanora*-type, rarely of *Bacidia*-type. Spores brown, ellipsoid to broadly oblong, mostly 1-septate, in one species 3-septate. (Fig. 3). CONIDIOMATA immersed, at least in upper part with dark brown wall, conidia bacilliform, mostly 4–8 µm long. PHOTOBIONT different species of *Trebouxia*.

Chemistry. Atranorin, chloroatranorin, gyrophoric acid, umbilicic acid, ovoidic acid, 5-O-methylhiassic acid, zeorin, variolaric acid, pannarin, sphaerophorin, isosphaeric acid, skyrin, stictic acid with satellites, secalonin acid A, thiomelin, arthothelin and thiophanic acid.

Note. Recognized by the crustose or squamulose thallus, the brown to black, mostly lecanorine apothecia, and the brown, 1-septate or 3-septate spores.

The treatment of the corticolous and muscicolous species is not as reliable as for the saxicolous ones as the former are in much need of taxonomic revision.

Spores

The characteristic apical and median wall thickenings have traditionally been fundamental characters for the circumscription of *Rinodina* species and a number of distinct spore types have been described (see below). The presence or absence of a torus (i.e. a dark belt in the region of a spore septum), sometimes used as a major character, is not always reliable for the recognition of spore types. The mode of spore ontogeny is another important character. Two main ontogenetic types can be observed with respect to the formation of the septum, which occurs in the earlier stages of ontogeny when the spores are still unpigmented: type A, where apical spore wall thickenings appear after septum formation (Fig. 3:1), and type B, where apical wall thickenings appear before (Fig. 3:2).

Within the species treated in detail in the present study, the following spore types were observed:

Bischoffii-type: pronounced median wall thickenings, apical thickenings less pronounced or lacking, pigmented band around the middle of the spore (Fig. 3:3); *Rinodina bischoffii*, *R. calcigena*, *R. immersa*.

Bicincta-type: median and apical wall thickenings well-developed, pigmented band around each cell, making the cells appearing as distinctly waisted (Fig. 3:4); *Rinodina endo-phragmia*, *R. lecanorina*, *R. luridata*.

Physconia-type: (incl. *Dubyana*- and *Orculariopsis*-type): ± pronounced median wall thickenings, apical thickenings less pronounced or lacking, spore lumina at their distal ends rounded (Fig. 3:5); *Rinodina archaea*, *R. balanina*, *R. calcigena*, *R. convexula*, *R. dubyana*, *R. interpolata*, *R. luridescens*, *R. occulta*, *R. pyrina*, *R. sicula*.

Pachysporaria-type: wall thickenings strongly developed all around the lumina which are ± rounded (Fig. 3:6); *Rinodina aspersa*, *R. atrocinerea*, *R. colobina*, *R. griseosoralifera*, *R. isidioides*, *R. stictica*, *R. teichophila*, *R. tephrae*.

Physcia-type: median and apical wall thickenings well-developed, spore lumina at their distal ends concave, torus usually developed, the septum formed before the wall

thickenings (Fig. 3:1, 3:7); *Rinodina colobina*, *R. confragosa*, *R. degeliana*, *R. disjuncta*, *R. efflorescens*, *R. exigua*, *R. laevigata*, *R. malangica*, *R. mniaraea*, *R. muscicola*, *R. occulta*, *R. olivaceobrunnea*, *R. parasitica*, *R. polyspora*, *R. roscida*, *R. septentrionalis*, *R. sheardii*, *R. terrestris*, *R. turfacea*.

Mischoblastia-type: median and apical wall thickenings strongly pronounced, forming extremely angular lumina (Fig. 3:8); *Rinodina colobina*, *R. deflectens*, *R. fimbriata*, *R. oxydata*, *R. teichophila*.

Milvina-type: similar to the *Physcia*-type, but particularly the apical wall thickenings are less pronounced, spore lumina at their distal ends flattened to slightly concave (Fig. 3:9); *Rinodina luridescens*, *R. milvina*, *R. rinodinoides*, *R. sophodes*.

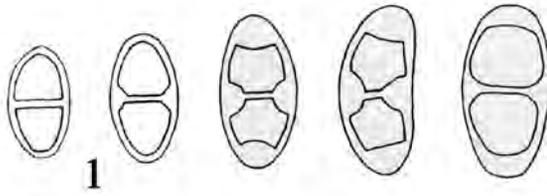
Tunicata-type: with markedly thickened outer wall layer (Fig. 3:10); *Rinodina calcarea*, *R. pityrea*.

Dirinaria-type: similar to the *Physcia*-type or *Physconia*-type, but usually lacking a torus and with type B ontogeny (Fig. 3); *Rinodina gennarii*, *R. insularis*, *R. metaboliza*.

Conradia-type: uniformly thickened walls and four rounded lumina, type B ontogeny (no fig.); *Rinodina conradii*.

As can be seen from this compilation, in some species the spores could not clearly be assigned to a single spore type. In contrast to all other species treated in detail, the development of the septum in spores of *R. calcarea* and *R. teichophila* may occur before or after the wall thickenings become distinct.

- | | |
|---|---|
| 1 Growing on other lichens | 2 |
| – Not growing on other lichens | 6 |
| 2 Apothecia lecideine. On species of the <i>Lecanora rupicola</i> group | 24. <i>R. insularis</i> |
| – Apothecia lecanorine | 3 |
| 3 On corticolous or muscicolous foliose lichens | 4 |
| – On crustose saxicolous lichens | 5 |
| 4 Cortex of apothecial margin I+. Spores 24–34 × 9–13.5 μm. Sphaerophorin | 53. <i>R. turfacea</i> var. <i>turfacea</i> |
| – Cortex of apothecia I–. Spores 16–25 × 6–10 μm. ± Pannarin | 37. <i>R. olivaceobrunnea</i> |
| 5 Mature spores constricted at septum, thickenings mostly reduced (<i>Milvina</i> -type), on various crustose lichens, only as young | 33. <i>R. milvina</i> |



Figs. 3:1–2: Ascospore ontogenies.

Fig. 3.1. Ascospore ontogeny of type A (*Rimodina confragosa*).

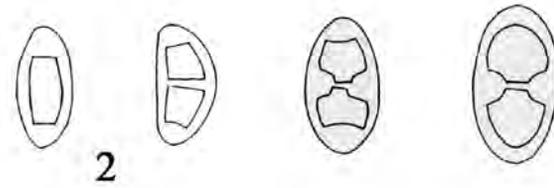
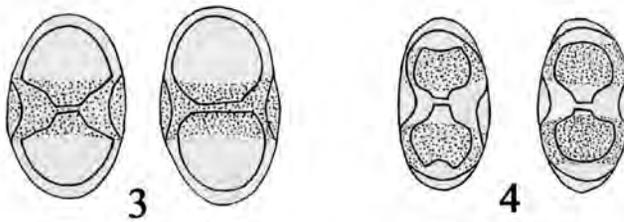


Fig. 3.2. Ascospore ontogeny of type B (*R. gemarii*).



Figs. 3:3–10: Ascospore types (mature and slightly overmature stages presented).

Fig. 3.3. *Bischoffii*-type (*R. bischoffii*).

Fig. 3.4. *Bicincta*-type (*R. lecanorina*).

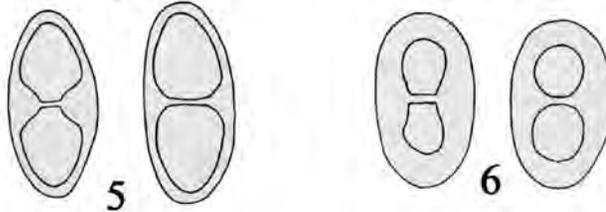


Fig. 3.5. *Physconia*-type (*R. archaea*).

Fig. 3.6. *Pachysporaria*-type (*R. atrocinerea*).

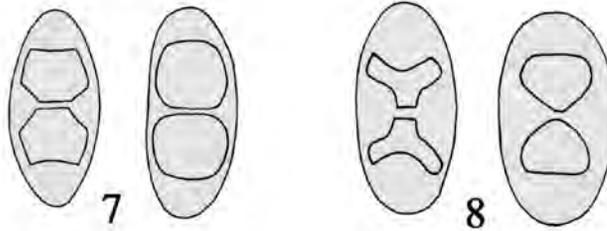


Fig. 3.7. *Physcia*-type (*R. confragosa*).

Fig. 3.8. *Mischoblastia*-type (*R. oxydata*).

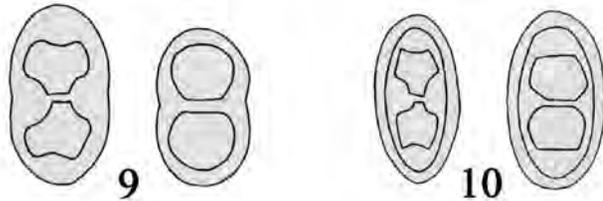


Fig. 3.9. *Milvina*-type (*R. milvina*).

Fig. 3.10. *Tunicata*-type (*R. pityrea*). (Modified after Giralt & Mayrhofer 1995 and Giralt 2001).

- Mature spores not constricted at septum, thickenings always present (*Physcia*-type), mainly on *Aspicilia* and *Rhizocarpon* 39. *R. parasitica*
- 6 Thallus corticolous, lignicolous, muscicolous, terricolous or on decaying plants 41
 - Thallus saxicolous 7
- 7 Thallus sorediate or verrucose-isidiate 8
 - Thallus not sorediate or verrucose-isidiate 9
- 8 Thallus verrucose-isidiate 4. *R. balanina*
 - Thallus sorediate 2. *R. aspersa*
- 9 Apothecia pseudolecanorine, biatorine or lecideine 10
 - Apothecia lecanorine 17
- 10 Calcicolous 11
 - Not calcicolous 13
- 11 Spores *Bischoffii*-type. Apothecia always immersed in the substrate 23. *R. immersa*
 - Spores *Bicincta*- or *Physconia*-type. Apothecia immersed or sessile 12
- 12 Spores *Bicincta*-type 29. *R. luridata*
 - Spores *Physconia*-type 15. *R. dubyana*
- 13 Spores *Mischoblastia*-type, 18–26 × 10–15 μm 38. *R. oxydata*
 - Spores of different type, smaller 14
- 14 Thallus grey-brown to dark brown, C+ red (hardly visible in dark thalli). Gyrophoric acid and related compounds 30. *R. luridescens*
 - Thallus sordid whitish, pale grey to grey, C– (see above). Other chemistry 15
- 15 Spores lacking apical thickenings during their ontogeny. Conidia filiform *Amandinea lecideina*
 - Spores with apical thickenings at least at young stages. Conidia bacilliform 16
- 16 Thallus thin, K+ yellow (sometimes very weak). Apothecia small, to 0.3 mm diam., sessile. Disc convex. Spores *Physcia*-type, 12–15 × 6–8 μm 36. *R. occulta*
 - Thallus thick, K–. Apothecia to 1 mm diam., immersed at first becoming sessile. Disc ± plane. Spores *Milvina*-type, 13–18 × 7–11 μm 43. *R. rinodinoides*
- 17 Spores lacking wall thickenings (indistinct thickenings at septum sometimes present) 18
 - Spores with distinct thickenings at least when young 19
- 18 Apothecia cryptolecanorine *Buellia* spp.
 - Apothecia eulecanorine *Amandinea cacuminum*
- 19 Thallus K+ yellow (atranorin) 20
 - Thallus K– 23
- 20 Thallus C+ red (gyrophoric acid). Spores *Pachysporaria*-type 3. *R. atrocinerea*
 - Thallus C–. Spores not *Pachysporaria*-type 21
- 21 Spores *Mischoblastia*-type 38. *R. oxydata*
 - Spores *Physcia*-type 22
- 22 Spores 16–27 × 8–13 μm 9. *R. confragosa*
 - Spores 12–15 × 7–8 μm 36. *R. occulta*
- 23 Mainly calcicolous. Spores *Bicincta*-, *Bischoffii*-, *Physconia*- or *Tunicata*-type 24
 - Mainly not calcicolous. Spores different 31
- 24 Spores *Bischoffii*-type 25
 - Spores not *Bischoffii*-type 27
- 25 Apothecia immersed in small depressions of the substrate. Hymenium not inspersed 23. *R. immersa*
 - Apothecia sessile. Hymenium inspersed, at least basally 26
- 26 Spores dark-pigmented near septum 5. *R. bischoffii*
 - Spores weakly pigmented near septum 7. *R. calcigena*
- 27 Spores *Tunicata*-type 6. *R. calcarea*
 - Spores not *Tunicata*-type 28
- 28 Spores *Physconia*-type 7. *R. calcigena*
 - Spores *Bicincta*-type 29
- 29 Thallus indistinct to endolithic or thin epilithic, greyish to ochraceous or brown. Apothecia first immersed becoming sessile. Disc often covered by a fine whitish-grey pruina. Spores 10–16 × 6.5–11 μm 29. *R. luridata*
 - Thallus thick, rimose areolate to subsquamulose. Apothecia immersed to broadly attached, disc without pruina. Spores 13–22 × 7.5–12.5 μm 30
- 30 Apothecia first immersed becoming slightly adnate when mature. Disc plane. Spores 13–20 × 7.5–12 μm 28. *R. lecanorina*
 - Apothecia broadly attached. Disc convex to semiglobose. Spores 16–22 × 9–12.5 μm 17. *R. endophragmia*
- 31 Spores *Dirinaria*-type, swollen around septum in K 21. *R. gennarii*
 - Spores not *Dirinaria*-type 32
- 32 Spores *Physconia*-type 33
 - Spores not *Physconia*-type 34
- 33 Margin of apothecia C+ red 47. *R. sicula*
 - Margin of apothecia C– 25. *R. interpolata*
- 34 Spores *Milvina*-type, when mature often constricted at septum 33. *R. milvina*
 - Spores not *Milvina*-type 35
- 35 Spores *Physcia*-type 36
 - Spores not *Physcia*-type 37
- 36 Spores 14–20 × 6–9 μm 25. *R. interpolata*
 - Spores 24–34 × 9–13.5 μm 53. *R. turfacea* var. *turfacea*
- 37 Spores *Mischoblastia*-type 38
 - Spores *Pachysporaria*-type 40
- 38 Apothecia immersed 19. *R. fimbriata*
 - Apothecia first immersed, becoming broadly attached or sessile 39

- 39 Apothecia first immersed, becoming sessile to broadly attached. Spores 20–32 × 11–19 µm, torus absent..... 50. *R. teichophila*
 – Apothecia sessile. Spores 16–24 × 9–11 µm, torus present. 12. *R. deflectens*
- 40 Apothecia at first broadly attached becoming sessile. Spores 16–24 × 8–14 µm, torus present..... 51. *R. tephraspis*
 – Apothecia first immersed, becoming sessile to broadly attached. Spores 20–32 × 11–19 µm, torus absent..... 50. *R. teichophila*
- 41 Thallus muscicolous, terricolous or on decaying plants .. 42
 – Thallus corticolous or lignicolous..... 55
- 42 Spores predominantly 3-septate 10. *R. conradii*
 – Spores predominantly 1-septate 43
- 43 Thallus crustose. Spore walls unevenly thickened..... 44
 – Thallus squamulose. Spore walls evenly thickened..... 54
- 44 Spores *Physconia*-type 1. *R. archaea*
 – Spores *Physcia*-type 45
- 45 Apothecia lecideine 35. *R. muscicola*
 – Apothecia lecanorine..... 46
- 46 Over-mature or even mature spores with apical protuberances..... 52. *R. terrestris*
 – Over-mature or even mature spores lacking apical protuberances..... 47
- 47 Cortex of apothecial margin at least 20 µm thick 48
 – Cortex of apothecial margin indistinct..... 50
- 48 Cortex of apothecial margin well-developed, I+. Sphaerophorin 53. *R. turfacea* var. *turfacea*
 – Cortex of apothecial margin indistinct to well-developed, I–. Sphaerophorin absent 49
- 49 Apothecia with white pruina. Medulla with oxalate crystals. Spores 24–35 × 8–13 µm..... 44. *R. roscida*
 – Apothecia without pruina. Medulla without oxalate crystals. Spores 16–25 × 6–10 µm..... 37. *R. olivaceobrunnea*
- 50 Hypothecium to 60 µm high 51
 – Hypothecium more than 100 µm high 52
- 51 Spores 24–35 × 8–13 µm. Medulla with oxalate crystals.... 44. *R. roscida*
 – Spores 16–25 × 6–10 µm. Medulla without oxalate crystals 37. *R. olivaceobrunnea*
- 52 Medulla orange or yellow, K+ violet 34. *R. mniaraea* var. *cinnamomea*
 – Medulla not orange or yellow, K+ yellow or K– 53
- 53 Thallus K+ yellow (atranorin)..... 34. *R. mniaraea* var. *mniaraeiza*
 – Thallus K– 34. *R. mniaraea* var. *mniaraea*
- 54 Thallus pale to dark-brown. Apothecia lecanorine, immersed, occasionally pruinose..... *Phaeorrhiza nimbosa*
 – Thallus dark yellowish brown to reddish brown. Apothecia biatorine to lecideine..... *Phaeorrhiza sareptana* var. *sphaerocarpa*
- 55 Thallus isidiate, blastidiate or sorediate 56
 – Thallus without vegetative propagules..... 66
- 56 Thallus isidiate 26. *R. isidioides*
 – Thallus blastidiate or sorediate..... 57
- 57 Thallus blastidiate 58
 – Thallus sorediate 60
- 58 Epihyemium brown, K– 31. *R. malangica*
 – Epihyemium grey to bluish, K+ violet..... 59
- 59 Spores *Tunicata*-type..... 40. *R. pityrea*
 – Spores not *Tunicata*-type 8. *R. colobina*
- 60 Thallus or soredia K+ yellow, atranorin..... 61
 – Thallus or soredia K– 63
- 61 Spores *Physcia*-type 13. *R. degeliana*
 – Spores *Pachysporaria*-type..... 62
- 62 P+ orange-red, stictic acid present 49. *R. stictica*
 – P+ pale yellow, stictic acid absent.... 22. *R. griseosoralifera*
- 63 Thallus P+ orange-red (pannarin). Spores *Physcia*-type..... 16. *R. efflorescens*
 – Thallus P-. Spores not *Physcia*-type 64
- 64 Thallus C–. Sphaerophorin..... 14. *R. disjuncta*
 – Thallus C+. Without sphaerophorin 65
- 65 Areolae whitish. Spores *Physcia*-type. Secalonic acid A.... 46. *R. sheardii*
 – Areolae yellowish. Spores apparently always immature. Arthothelin and thiophanic acid 20. *R. flavosoralifera*
- 66 Spores predominantly 3-septate 10. *R. conradii*
 – Spores predominantly 1-septate 67
- 67 Epihyemium grey to blue, K+ violet..... 68
 – Epihyemium brown, K– 69
- 68 Spores *Tunicata*-type..... 40. *R. pityrea*
 – Spores not *Tunicata*-type 8. *R. colobina*
- 69 Asci 12–16-spored 41. *R. polyspora*
 – Asci 8-spored 70
- 70 Spores slightly curved, wall thickenings absent 42. *R. pyrina*
 – Spores mostly straight, wall thickenings present at least at young stages 71
- 71 Thallus granular to leprose..... 31. *R. malangica*
 – Thallus not granular to leprose..... 72
- 72 Spores more than 23 µm long 73
 – Spores to 22 µm long 75
- 73 Cortex of apothecial margin at least 10 µm thick 74
 – Cortex of apothecial margin indistinct..... 34. *R. mniaraea* var. *mniaraea*
- 74 Thallus thin, verrucose to areolate, whitish grey. Corticolous 53. *R. turfacea* var. *cinereovirens*
 – Thallus inconspicuous or evanescent, pale brown. Lignicolous or rarely corticolous..... 53. *R. turfacea* var. *ecrustacea*

- 75 Spores swollen around septum in K..... 76
 – Spores not swollen around septum in K..... 77
 76 Thallus greyish white, rimose-areolate. Ascospores brown, broadly ellipsoid. Lignicolous or rarely corticolous 21. *R. gennarii*
 – Thallus olivaceous grey, verrucose or areolate. Spores pale brown, narrowly ellipsoid to subcylindrical. Mainly corticolous 32. *R. metaboliza*
 77 Thallus K+ yellow, atranorin..... 18. *R. exigua*
 – Thallus K- 78
 78 Mature spores *Physconia*-type 79
 – Mature spores not *Physconia*-type 80
 79 Spores 14–18 × 6–9 µm 11. *R. convexula*
 – Spores 17–22 × 8–11 µm 1. *R. archaea*
 80 Mature spores *Milvina*-type, constricted at septum. Cortex I+ 48. *R. sophodes*
 – Mature spores *Physcia*-type, not constricted at septum. Cortex absent or I- 81
 81 Cortex thick, consisting of dense intricate hyphae..... 27. *R. laevigata*
 – Cortex indistinct or thin, not consisting of dense intricate hyphae 45. *R. septentrionalis*

1. *Rinodina archaea* (Ach.) Arnold

Flora 64: 195 (1881). – *Parmelia sophodes* y [var.] *P. archaea* Ach., Methodus: 156 (1803). – TYPE: Locality not indicated (BM lectotype, Ropin & Mayrhofer, Herzogia 9: 791, 1993) [H-ACH 1180A to be excluded].

Syn. *Rinodina archaea* f. *paupera* H. Magn., *R. arctica* H. Magn., *R. exigua* f. *lecidaina* (Nyl.) Th. Fr., *R. lecideoides* (Nyl.) Kernst., *R. lecideoides* var. *cinerea* H. Magn., *R. subobscura* H. Magn., *R. trevisanii* (Hepp) Kõrb.

D: brun knaplav **F:** pihanappijäkälä

Literature: Magnusson, Acta Horti Gothob. 17: 301–308 (1947); Ropin & Mayrhofer, Herzogia 9: 791–795 (1993); Giralt & Mayrhofer, Biblioth. Lichenol. 57: 139–141 (1995).

THALLUS thin, usually effuse, minutely granular or sub-areolate or sometimes evanescent, pale red-brown to dark brown. Prothallus absent. APOTHECIA abundant, scattered to confluent, 0.3–0.6 mm diam., lecanorine, subimmersed to sessile. Disc plane to slightly convex, dark reddish brown to black. Cortex indistinct or to 15–35 µm thick below, often I+ faintly blue. Hymenium 70–90 µm tall. Epihymenium red-brown. Hypothecium to 50 µm high. Spores *Physconia*-type, smooth to minutely warted, 17–22 × 8–11 µm, torus well-developed, ontogeny of type A. Conidia 3.5–4 × 0.6–0.8 µm.

Chemistry. Zeorin (not always).

Habitat. Lignicolous or more rarely corticolous or on plant debris in somewhat nitrophilous situations, such as bases of mainly deciduous trees or stumps or on wooden fences, rarely on twigs.

Distribution. Widely distributed in Norway, Sweden and Finland, rare in Iceland, Greenland and Denmark. **D:** Brn **Gr F:** V U St EH ES PH PS KP Kn OP PeP Ks KiL EnL InL. **I:** IVe IAu. **N:** Ak Op MR ST SNo NNo Tr VFi ØFi. **AI:** Sb. **S:** Sk Bl ÖI Gtl SmI HI Bh Dls Vg Ög Nrk Srm Vrm Vsm Upl Dlr Hls Mpd Ång Hrj Jmt Vb Nb ÅsL LyL LL TL. Also known from central, southern and eastern Europe, Macaronesia, North America and Siberia.

Note. Characterized by poorly developed often brown thalli, usually scattered apothecia and large, *Physconia*-type spores with a well-developed torus. The records of *Rinodina lignaria* from Sweden (Magnusson 1947), of *R. convexula* from LL, Sweden (Santesson 1993) and of *R. laxa* from Norway (Santesson 1993) all refer to *R. archaea*.

2. *Rinodina aspersa* (Borrer) J.R. Laundon

Lichenologist 18: 175 (1986). – *Lecanora aspersa* Borrer in Hook., Suppl. Engl. Bot. 2: tab. 2728 (1832). – TYPE: British Isles, England, Sussex, Borrer (BM lectotype, Laundon, Lichenologist 18: 175, 1986).

Syn. *Rinodina fatiscens* (Th.Fr.) Vain., *R. exigua* var. *fatiscens* Th.Fr.

Literature: Mayrhofer & Poelt, Biblioth. Lichenol. 12: 95–96 (1979); Laundon, Lichenologist 18: 175–177 (1986); Giralt & Barbero, Mycotaxon 56: 51–53 (1995).

THALLUS poorly developed, composed of scattered roundish areolae, sordid whitish to grey. Prothallus black. Soralia delimited, punctiform, flat, superficial somewhat elevated, concolorous or paler than areolae; soredia farinose. APOTHECIA rare, to 1 mm diam., lecanorine, scattered, broadly attached or constricted at base. Disc brown, paler when wet, plane. Hymenium to 100 µm tall. Epihymenium brown, with fine granules. Hypothecium to 100 µm high. Spores often poorly developed, of *Pachysporaria*-type, 15–20 × 10–13 µm, torus developed, ontogeny of type A. CONIDIOMATA not seen.

Chemistry. Areolae and soralia K+ yellow, C+ orange-red, P+ yellow. Atranorin, gyrophoric acid (with lecanoric and orsellinic acids), umbilicic acid, ovoic acid, 5-O-methylhiassic acid.

Habitat. Saxicolous, on siliceous rocks, often on pebbles in humid and shaded places.

Distribution. Occurring in southern Finland, central and southern Sweden and Denmark. **D:** Sjø Brn. **F:** U. **S:** Sk Öl Gtl Sml Bh Vg Ög NrK Srm Vrm Vsm Upl. A rare species distributed from temperate Europe to south Portugal and the mediterranean islands Corsica and Sardinia.

Note. Characterized by its sorediate whitish thallus on a black prothallus and the presence of atranorin and gyrophoric acid.

3. *Rinodina atrocinerea* (Hook.) Körb.

Syst. Lich. Germ.: 125 (1855). – *Lecidea atrocinerea* Hook., Engl. Fl. 5(1): 174 (1833). – TYPE: Herb. W. Withering 59 (BM lectotype, Sheard, Lichenologist 3: 356, 1967).

Syn. *Rinodina plumbella* (Nyl.) H. Olivier, *R. tympanelloides* Bagl. ex Arnold

Literature: Sheard, Lichenologist 3: 355–356 (1967); Mayrhofer & Poelt, Biblioth. Lichenol. 12: 56–58 (1979); Mayrhofer, J. Hattori Bot. Lab. 55: 377–378 (1984); Laundon, Lichenologist 18: 176 (1986); Giralt & Barbero, Mycotaxon 56: 53–56 (1995).

THALLUS thin to moderately thick, areolate; areolae 0.4–1.3 mm wide, flat, discrete, scattered to contiguous, sordid whitish to grey or ochraceous. Prothallus black. APOTHECIA abundant, 0.5–1 mm diam., lecanorine, subimmersed to adnate. Disc plane to rarely slightly convex, brown to brown-black. Hymenium 90–130 µm tall. Epithymenium brown. Hypothecium to 150 µm high, colourless. Spores *Pachysporaria*-type, faintly warted, 15–21 × 8.5–13.5 µm, torus developed, ontogeny of type A. CONIDIOMATA frequent, conidia bacilliform, 4–6 × 0.6–1.0 µm.

Chemistry. Thallus K⁺ yellow, C⁺ red (often faint and evanescent), P⁺ yellow. Epithymenium C⁺ red (microscopic slide). Atranorin, gyrophoric acid (with lecanoric and orsellinic acids), umbilicic acid, ovoid acid and ± 5³-O-methylhiassic acid.

Habitat. Saxicolous, on coarse, hard, siliceous rocks, often granite; especially near the coast.

Distribution. Abundant in southern Norway and southern Sweden, scattered in central Norway (up to Vega Island) and central Sweden, rare in Denmark. **D:** Brn. **N:** AA VA Ro Ho SF ST SNo. **S:** Sk Bl Gtl Sml Hl Bh Dls Vg NrK Srm Vrm Vsm Upl. Widely distributed in the British Isles and in western Europe, scattered in southern Europe and rare at oceanic sites in central Europe.

Note. The pale coloured, areolate thallus and contrasting black prothallus, the frequent conidiomata together with the chemistry are diagnostic.

4. *Rinodina balanina* (Wahlenb.) Vain.

Ark. Bot. 8(4): 69 (1909). – *Lichen balaninus* Wahlenb., Flora Lapon.: 426 (1812). – TYPE: [Norway, Finnmark] In petris insulae sinus Altensis, 13.V.1802 Wahlenberg (UPS lectotype, Mayrhofer & Moberg, Nordic Lichen Flora 2: 72, 2002).

Syn. *Physcia balanina* (Wahlenb.) Th.Fr.

D: roset-knaplav

Literature: Mayrhofer & Poelt, Biblioth. Lichenol. 12: 61–62 (1979).

THALLUS thick, orbicular, sometimes irregular, effigurate with radiating lobes, central parts verrucose to isidiate, pale brown to dark brown; upper and lower cortex present, paraplectenchymatous; isidia developing from verrucae, more abundant in central parts. APOTHECIA to 2 mm diam., usually absent (observed only in very few specimens), lecanorine with thick, crenulate margins, constricted at the base. Disc dark brown to black, concave. Hymenium to 140 µm tall. Epithymenium reddish brown. Hypothecium to 200 µm high. Spores usually poorly developed, *Physconia*-type, 14–18 × 7–9 µm (Vainio 1909: 70, 14–23 × 7–10 µm); comparable with those of *Rinodina peloleuca* (Matzer et al. 1998). Conidia bacilliform, 5 × 1 µm (Vainio 1909: 70: gave 3 × 1 µm).

Chemistry. No secondary substances (by TLC) in Nordic material.

Habitat. Saxicolous, on siliceous seashore rocks manured by birds.

Distribution. Along the coast from Nordland to the Arctic Islands. **Gr N:** SNo NNo Tr VFi ØFi. **AI:** JM Bi Sb. Also known from Kola, Novaya Zemlya and the Behring Strait.

Note. Characterized by its thick, brown, orbicular thallus with radiating lobes and isidia in central parts.

5. *Rinodina bischoffii* (Hepp) A. Massal.

Framm. Lichenogr.: 26 (1855). – *Psora bischoffii* Hepp, Flechten Europas 81 (1853). – TYPE: [Switzerland] Zürich, an Kalk u. Nagelfluhfelsen, Hepp, Flechten Europas No 81 (G lectotype, Mayrhofer & Moberg, Nordic Lichen Flora 2: 72, 2002).

Syn. *Rinodina subrubescens* (Vain.) Zahlbr.

D: insaenket knaplav

Literature: Mayrhofer & Poelt, Biblioth. Lichenol. 12: 62–70 (1979); Mayrhofer, J. Hattori Bot. Lab. 55: 382–386 (1984); Giralt & Llimona, Mycotaxon 62: 183–186 (1997).

Figs: Sheard 1967: 334; Wirth 1995: 828.

THALLUS endolithic to epilithic, evanescent or inconspicuous, thin, to 0.3 mm, of discrete scurfy granules or rarely rimose-areolate, pale grey, grey to ochraceous. APOTHECIA abundant, 0.4–1 mm diam., lecanorine, crowded, broadly attached to constricted at the base. Disc plane, becoming convex, dark brown to almost black. Hymenium 80–120 μm tall, oil droplets abundant especially in the lower parts. Spores *Bischoffii*-type, walls smooth to finely rugulate, 15–21 \times 9–13 μm , torus absent, ontogeny of type A. Conidia bacilliform, 4–5 \times 1 μm .

Chemistry. No secondary substances (by TLC) in Nordic material.

Habitat. Saxicolous, on calcareous rocks, mortar, roofing tiles and on calciferous schist.

Distribution. Rare in Norway, locally abundant in southern and central Sweden with scattered localities in northern Sweden and southern Finland. **Gr F:** *V. N:* *Ak Op ST SNo Tr. S:* *Sk Öl Gtl Klm Vg Ög NrK Srm Vsm Dlr Jmt LyL TL.* Widely distributed in temperate areas of the Northern Hemisphere (North America, Asia, Europe), mediterranean Europe and North Africa and in Australasia.

Note. Characterized by its interspersed hymenium and *Bischoffii*-type spores.

6. *Rinodina calcarea* (Arnold) Arnold

Verh. Zool.-Bot. Ges. Wien 29: 362 (1879). – *Rinodina caesiella* var. *calcarea* Arnold, Flora 43: 69 (1860). – TYPE: [Germany, Bavaria] An einem Kalkfelsen oberhalb Zimmern bei Pappenheim, 1860, Arnold: Lich. exs. 161 (M lectotype, Mayrhofer & Poelt, Biblioth. Lichenol. 12: 72, 1979).

Literature: Mayrhofer & Poelt, Biblioth. Lichenol. 12: 72–74 (1979); Mayrhofer, J. Hattori Bot. Lab. 55: 388–390 (1984); Giralt & Llimona, Mycotaxon 62: 187–188 (1997).

Figs: Wirth 1995: 835.

THALLUS thick, rimose-areolate to areolate; areolae smooth to granulose- verrucose, flat to convex, whitish grey to pale brownish, often with a pruinose appearance. Prothallus absent. APOTHECIA scattered, 0.5–1 mm diam., lecanorine, adnate to sessile. Disc plane, brown to brown-black. Hymenium 90–130 μm tall. Epithymenium reddish brown. Hypothecium to 200 μm high, colourless. Spores *Tunicata*-type, 17–26 \times 10–16 μm , torus absent, ontogeny intermediate between types A and B. CONIDIOMATA not seen.

Chemistry. No secondary substances (by TLC) in Nordic material.

Habitat. Saxicolous, on exposed calcareous rocks.

Distribution. Very rare on the islands of Gotland and Öland. **S:** Öl Gtl. Very rare in England, scattered in central and southern Europe, northern Africa, Asia minor and Central Asia.

Note. Characterized by the thick thallus and the *Tunicata*-type spores.

7. *Rinodina calcigena* (Th. Fr.) Lyngé

Rep. Sci. Res. Norwegian Exped. Novaja Zemlya 1921(43): 251 (1928). – *Rinodina mniaraea* var. *calcigena* Th. Fr., Kongl. Svenska Vetenskaps-akad. Handl. 7(2): 25 (1867). – TYPE: Spitzbergen, Ad saxa calcarea circa Treurenbergbay, 1861 Malmgren (UPS lectotype, Mayrhofer & Sheard, Bryologist 91: 106, 1988).

Syn. *Rinodina occidentalis* Lyngé

D: kalk-knaplav

Literature: Mayrhofer & Sheard, Bryologist 91: 106–108 (1988).

THALLUS evanescent, present only around apothecia or as thin, scattered granules on the substrate, more rarely thick, tumid areolate; areolae to 1.0–1.2 mm wide, shining or matt, brown or grey. Prothallus absent. APOTHECIA abundant, 0.6–0.9 mm diam., immersed to sessile, lecanorine. Disc plane to convex, sometimes pruinose (best seen when wet), black. Hymenium 60–110 μm tall, oil droplets present. Epithymenium dark brown. Hypothecium 40–120 μm high, colourless, developing a stipe. Spores *Physconia*-type, a lightly pigmented band similar to the *Bischoffii*-type is sometimes evident around the septum at maturity, in some respects the spores appear to be intermediate between the *Bischoffii*- and *Physconia*-type, 16–24 \times 9.5–13 μm , torus absent, ontogeny of type A. CONIDIOMATA not seen.

Chemistry. No secondary substances (by TLC) in Nordic material.

Habitat. Saxicolous, on calcareous rocks in arctic or alpine environments.

Distribution. Arctic-alpine species, scattered in Greenland, Svalbard, central and northern Norway, central and northern Sweden. **Gr F:** A. **N:** Op NNo VFi ØFi. **AI:** Sb. **S:** Jmt TL. Also recorded from Novaya Zemlya, Siberia and North America.

Note. Characterized by its inspersed hymenium and the intermediate spores. Similar to *R. bischoffii* but spores less pigmented near septum. One record of *R. castanomelodes* from Torne Lappmark (Mayrhofer 1984: 394) refers to *R. calcigena*.

8. *Rinodina colobina* (Ach.) Th. Fr.

Lichenogr. Scand. 1: 205 (1871). – *Lecanora colobina* Ach., Lich. Univ.: 358 (1810). – Type: France "Gallia", Du Four 309 (H-ACH 1179 holotype); France, Meurthe et Moselle, Nancy, Route de Besançon, Harmand, Lich. Loth. Exs. No 547 (M epitype, Ropin & Mayrhofer, Biblioth. Lichenol. 58: 364, 1995).

Syn. *Rinodina leprosa* (Schaer.) A. Massal.

D: grå knaplav **F:** haavannappijäkälä **S:** allékrimmerlav

Redlisted in: **D**

Literature: Tønsberg, Sommerfeltia 14: 281–282 (1992); Ropin & Mayrhofer, Biblioth. Lichenol. 58: 364–372 (1995).

THALLUS thin, verrucose, granulose to leprose, often blastidiate, dark grey, greyish blue to blackish. Prothallus indistinct. **APOTHECIA** rare, 0.4–0.7 mm diam., lecanorine, broadly attached, margin often crenulate. Disc plane to convex, black. Cortex to 50 µm thick. Hymenium 70–90 µm tall. Epithymenium grey to bluish or greenish grey, K+ violet. Hypothecium to 70 µm high. Spores intermediate between *Pachysporaria*-, *Physcia*- and *Mischoblastia*-type, yellowish brown, smooth, 16–21 × 7–9 µm, torus absent, ontogeny of type A. **CONIDIOMATA** not seen.

Chemistry. Cortical layer of the thallus K+, C+ and N+ violet; no secondary substances (by TLC) in Nordic material.

Habitat. Corticolous, on rough-barked base of deciduous trees, rarely lignicolous.

Distribution. Rare in southern Norway, scattered in southern and central Sweden, rare in southern Finland. **D:** Sjø **F:** St EH. **N:** Øf Ak He Bu Te AA Ho. **S:** Gtl SmI Hl Vg Ög Srm Vrm Vsm Upl. Also known from central and southern Europe, northern Africa, Asia and North America; the species is very sensitive against changes in its environment especially in central Europe.

Note. Characterized by its leprose to blastidiate, dark thallus, the grey, K+ violet epithymenium, and the intermediate spores. *Rinodina pityrea* has similar thallus and epithymenium characters but is distinguished by *Tunicata*-type spores. Sterile thalli of *R. colobina* cannot be separated from *R. pityrea*.

9. *Rinodina confragosa* (Ach.) Körb.

Syst. Lich. Germ.: 125 (1855). – *Parmelia confragosa* Ach., Methodus: 33 (1803). – TYPE: [Sweden] Suecia (H-ACH 1030A lectotype, Mayrhofer & Moberg, Nordic Lichen Flora 2: 72, 2002).

Syn. *Rinodina crassescens* (Nyl.) Arnold, *R. caesiella* (Flörke) Flot., *R. firma* (Nyl.) Arnold, *R. confragosa* var. *dispersa* Räsänen, *R. confragosa* var. *exterior* (Nyl.) H. Olivier, *R. confragosa* var. *extrusa* (Vain.) H. Olivier

F: ryhmynappijäkälä **S:** lodkimmerlav

Literature: Mayrhofer & Poelt, Biblioth. Lichenol. 12: 86–91 (1979); Mayrhofer, J. Hattori Bot. Lab. 55: 397–400 (1984); Matzer & Mayrhofer, Bothalia 26: 14–16 (1996).

Figs: Wirth 1995: 831.

THALLUS thin to thick, 0.3–0.8 mm, continuous and areolate, rimose-cracked or composed of discrete warts, sometimes minutely squamulose, whitish or pale grey to ochraceous. Prothallus absent to well developed, brown to black. **APOTHECIA** abundant, 0.5–1.5 mm diam., lecanorine, crowded, sometimes contiguous, a proper margin sometimes developed, broadly attached. Cortex distinct, I+ faintly blue. Disc plane to slightly convex, brown to black. Hymenium 80–110 µm tall. Epithymenium brown to dark brown. Hypothecium to 200 µm high, colourless. Spores *Physcia*-type, finely rugulate, 16–27 × 8–13 µm, torus developed, ontogeny of type A. Conidia bacilliform, 4–5.5 × 1–1.5 µm.

Chemistry. Thallus K+ yellow, C–, KC–, P+ yellow. Atranorin, chloroatranorin, ± zeorin.

Habitat. Saxicolous, on exposed hard siliceous rocks, often on vertical surfaces and in overhangs.

Distribution. Widely distributed in Norway, Sweden and Finland, scattered in Denmark and Iceland. **D:** Sjø Brn. **F:** A V U EK St EH ES LK PH PS PK PeP Ks KiL InL. **I:** IVe. **N:** Op Bu Ro Ho SF MR ST SNo NNo Tr VFi. **S:** Sk Bl ÖI Gtl Sml HI Bh Dls Vg Ög Nrk Srm Vrm Vsm Upl Mpd Hrj LyL LL TL. Widely distributed in Europe, also known from North America and South Africa.

Note. Characterized by its pale thallus, the presence of atranorin and *Physcia*-type spores.

10. *Rinodina conradii* Körb.

Syst. Lich. Germ.: 123 (1855). – TYPE: [Poland] Conradsthal bei Salzbrunn, Körber (L lectotype, Mayrhofer & Moberg, Nordic Lichen Flora 2: 72, 2002).

Syn. *Rinodina pyreniospora* (Nyl.) Branth & Rostr., *R. conradii* var. *paupercula* (Nyl.) Branth & Rostr., *R. conradii* f. *saepincola* Körb., *R. conradii* f. *luxurians* H. Magn., *Lecanora sophodes* var. *terrestris* Flot.

Redlisted in: **D**

Literature: Magnusson, Meddel. Göteborg Bot. Trädg. 17: 322–326 (1947); Sheard, Lichenologist 3: 356–357; Hinteregger, Mayrhofer & Poelt, Mitt. Naturwiss. Vereines Steiermark 119: 92 (1989); Mayrhofer, Sheard, Grassler & Elix, Bryologist 104: 456–463 (2001).

Figs: Mayrhofer et al 2001: 458 (spores) and 462 (map).

THALLUS inconspicuous, thin, minutely granular to rarely thick and areolate, at times completely covered with apothecia, usually reddish brown, sometimes dark brown, brownish green or greyish brown. Prothallus indistinct. **APOTHECIA** abundant, 0.2–0.5(–1.0) mm diam., lecanorine, crowded, sometimes contiguous, broadly attached. Disc plane to convex, reddish brown to black-brown. Cortex rarely present, to 15 µm wide. Hymenium 90–135 µm tall. Epi-hymenium reddish brown. Hypothecium to 70 µm high, colourless to pale yellowish. Spores *Conradii*-type, 4-celled, 23–35 × 9–14 µm, torus distinct, ontogeny of type B. **CONIDIOMATA** not seen.

Chemistry. No secondary substances (by TLC) in Nordic material.

Habitat. Muscicolous or on decaying plants but also terricolous, lignicolous or corticolous.

Distribution. Widely distributed in Sweden, more rarely in Norway, Finland and Denmark, also known from Iceland and Svalbard. **D:** NJy ØJy Fyn Sjø. **Gr F:** V U EH EP PH

PeP Ks EnL. **I:** IVe. **N:** Ak Op Ro ST Tr ØFi. **AI:** Sb. **S:** Sk Bl ÖI Gtl Sml Bh Dls Vg Ög Nrk Srm Vrm Vsm Upl Dlr Mpd Hrj Jmt PL LL TL. Also known from western, central and the montane belt of southern Europe, North America, Siberia, the Himalayan mountains, South America and Australasia.

Note. Characterized by the 4-celled spores.

11. *Rinodina convexula* H. Magn.

Acta Horti Gothob. 17: 290 (1947). – TYPE: Finland, Ostrobothnia borealis, Simo, Simonkylä, Pahnilankangas, 1936 Räsänen, Lich. Fenn. Exs. No. 609 (UPS lectotype, Mayrhofer & Moberg, Nordic Lichen Flora 2: 72, 2002).

Syn. *Rinodina orculata* Poelt & M. Steiner, *Rinodina trevisanii* auct.

Literature: Ropin & Mayrhofer, Herzogia 9: 827–831 (1993); Giralt & Mayrhofer, Biblioth. Lichenol. 57: 148–149 (1995).

THALLUS thin, effuse, yellowish brown, grey-brown to reddish brown. Prothallus indistinct. **APOTHECIA** abundant, 0.2–0.5 mm diam., lecanorine, subimmersed to sessile. Disc plane, brown to dark brown. Cortex to 30 µm, I+ violet. Hymenium 60–80 µm tall. Epihymenium red-brown. Hypothecium to 50 µm high, colourless. Spores *Physconia*-type, smooth or finely rugulate, 14–18 × 6–9 µm, torus well-developed, ontogeny of type A. **CONIDIOMATA** not seen.

Chemistry. No secondary substances (by TLC) in Nordic material.

Habitat. Corticolous, on the base of deciduous trees (in the Alps also on conifers).

Distribution. Rare in central Finland and Sweden. **F:** PeP. **S:** Vg Upl. Common in the Alps, also in Canada.

Note. Characterized by the small apothecia, the thin thallus and the small *Physconia*-type spores.

12. *Rinodina deflectens* (Nyl.) Blomb. & Forssell

Enum. Plant. Scand.: 71 (1880). – *Lecanora deflectens* Nyl., Flora 58: 8 (1875). – TYPE: Finland, Tavastia australis, Hollola, Taaveli, 1873 E. Lang (TUR-V 8980a lectotype, Mayrhofer et al., Nord. J. Bot. 12: 451, 1992).

Syn. *Rinodina griseofusca* (Nyl.) H. Olivier

Literature: Mayrhofer, Scheidegger & Sheard, Nord. J. Bot. 12: 451–452 (1992).

THALLUS consisting of discontinuous segments, rapidly developing minute, contiguous granules giving a rough surface to the thallus, or rimose-areolate, grey-brown. APOTHECIA abundant, to 0.5 mm diam., lecanorine, contiguous, sessile, with prominent proper margin; thalline margin dark brown at first, becoming excluded by growth of proper margin. Disc plane, sometimes becoming convex, dark brown to black. Hymenium 80–90 μm tall. Epithymenium dark brown. Hypothecium to 110 μm high, colourless. Spores *Mischoblastia*-type, mature spores more heavily pigmented than usual, walls finely rugulate, 16–24 \times 9–11 μm , torus developed, ontogeny of type A. Conidia bacilliform, 4–5 \times 1 μm .

Chemistry. Medulla partly orange, K + violet. Thallus reactions otherwise negative; no secondary substances were identified.

Habitat. Saxicolous, on siliceous rocks, but ecology insufficiently known.

Distribution. Known only from two localities in Finland. **F:** EH.

Note. Characterized by its loosely attached, grey-brown thallus, the lecanorine apothecia with prominent proper margin and the *Mischoblastia*-type spores. The species was included by Mayrhofer (1984) under *Rinodina badiella* (= *tephraspis*). Sheard (1967) and Mayrhofer & Poelt (1979) placed *Rinodina griseofusca* in the synonymy of *R. oxydata*.

13. *Rinodina degeliana* Coppins

Lichenologist 15: 147 (1983). – TYPE: Sweden, Lule Lappmark, Kvikkjokk, 3 km SSW of Kvikkjokk, SE slope of Nammatj, Coppins & Tibell 6328 (E holotype, UPS isotype).

S: gammelsälglav

Literature: Coppins, Lichenologist 15: 147–150 (1983); Tønsberg, Sommerfeltia 14: 282–284 (1992); Wong & Brodo, Syllogeus 69: 69–70 (1992); Giralt, Mayrhofer & Sheard, Lichenologist 27: 18–19 (1995); Sheard, Herzogia 11: 118 (1995); Giralt, Mayrhofer, van den Boom & Elix, Lichenologist 33: 101 (2001).

THALLUS areolate to subsquamulose; areolae discrete or contiguous, greyish white to greyish green, sorediate. Soralia marginal, linear to labriform, discrete or rarely confluent; areolae sometimes completely dissolved in diffuse soralia. Prothallus indistinct. APOTHECIA rare, 0.3–0.6 mm diam., lecanorine, sessile, constricted at base. Thalline margin \pm sorediate. Disc plane, blackish brown. Cortex present, dilute straw-coloured due to atranorin crystals, I+ faint blue. Hymenium 75–85 μm tall. Epithymenium

reddish brown. Hypothecium to 70 μm high, colourless. Spores *Physcia*-type, walls rugulate, 19–25 \times 10–14 μm , torus developed, ontogeny of type A. CONIDIOMATA not seen.

Chemistry. Areolae, soralia and thalline margin K+ yellow, C–, KC–, P+ yellow. Atranorin, chloroatranorin, zeorin.

Habitat. Corticolous, on acidic bark of old trees, mainly growing in open woodland but also found in more shaded situations.

Distribution. Scattered in central and southern Norway, rare in northern Sweden. **N:** Øf Ak He Op Bu Te AA VA Ro Ho SF ST NT SNo. **S:** Dlr Jmt LL. Also known from Scotland, Austria and North America.

Note. Recognized by the flat, adnate to raised, whitish grey to greenish grey areolae, the marginal, more or less labriform or diffuse soralia, the presence of atranorin and zeorin and the *Physcia*-type spores.

14. *Rinodina disjuncta* Sheard & Tønsberg

Sommerfeltia 14: 284 (1992). – TYPE: Norway, Nord-Trøndelag, Namdalseid, north-facing slope south of lake Altvatn, 110 m, 1983 Tønsberg 8445 (BG holotype; E, UPS isotypes).

Literature: Tønsberg, Sommerfeltia 14: 284–286 (1992); Giralt, Mayrhofer & Sheard, Lichenologist 27: 19 (1995); Sheard, Herzogia 11: 118 (1995); Giralt, Mayrhofer, van den Boom & Elix, Lichenologist 33: 100–101 (2001).

Figs: Tønsberg, Sommerfeltia 14: 285 (1992).

THALLUS areolate; areolae greyish white, pale greyish green to green, discrete and scattered, rarely contiguous, usually convex, blastidiate. Blastidia (consoredia according to Tønsberg) discrete or sometimes confluent, irregularly elongate. Prothallus sometimes distinct, fimbriate (more or less radiating bundles of brown hyphae). APOTHECIA sparse, rarely abundant, to 1.3 (–2.0) mm diam., lecanorine, sessile, constricted at base, thalline margin thick, often crenulate to blastidiate. Disc plane to convex, brown to black, rarely slightly pruinose towards the centre. Cortex of the apothecial margin distinct, to 50 μm , I–. Hymenium 100–170 μm tall. Epithymenium brown. Hypothecium 50–75 μm high, colourless. Spores *Physcia*-type, smooth, 19–31 \times 10–15 μm , torus well-developed, ontogeny of type A. CONIDIOMATA not seen.

Chemistry. Sphaerophorin, atranorin (trace), sometimes isosphaeric acid (trace).

Habitat. Corticolous, on deciduous trees in the humid, coastal *Picea*-forest in central Norway.

Distribution. So far known only from central Norway. **N:** ST NT SNo. Otherwise known from the Pacific coast of North America from northern California to Alaska.

Note. Recognized by the diffuse blastidia, the chemical constituent sphaerophorin and large *Physcia*-type spores.

15. *Rinodina dubyana* (Hepp) J. Steiner

Verh. Zool.-Bot. Ges. Wien 69: 60 (1919). – *Lecidea dubyana* Hepp, Flechten Europas 322 (1857). – TYPE: [Switzerland] Kant. Zürich und bei Liestal, Kant. Baselland, Hepp, Flechten Europas No 322 (G lectotype, Mayrhofer & Moberg, Nordic Lichen Flora 2: 72, 2002).

Syn. *Buellia lygaeodes* Körb., *Rinodina mediterranea* (Stizenb.) Flagey

Literature: Mayrhofer & Poelt, Biblioth. Lichenol. 12: 91–94 (1979); Mayrhofer, J. Hattori Bot. Lab. 55: 405–407; Giralt & Llimona, Mycotaxon 62: 191–192 (1997).

THALLUS endolithic, rarely indistinctly epilithic, whitish to grey. Prothallus absent. APOTHECIA abundant, 0.3–0.6 mm diam., pseudolecanorine, immersed in the substrate to sessile. Disc plane to slightly convex, brown to black. Hymenium 80–100 µm tall. Epihymenium dark brown. Hypothecium to 100 µm high, colourless. Spores *Physconia*-type, 13–18 × 8–11 µm, torus absent, ontogeny of Type A. CONIDIOMATA not seen.

Chemistry. No secondary substances (by TLC) in Nordic material.

Habitat. Saxicolous, on calcareous rocks on sloping or horizontal surfaces.

Distribution. Rare on Öland and Gotland. **S:** Öl Gtl. Widely distributed in southern Europe, scattered in central Europe, northern Africa and Asia minor.

Note. Characterized by its endolithic thallus, pseudo-lecanorine apothecia and *Physconia*-type spores.

16. *Rinodina efflorescens* Malmé

Svensk Bot. Tidskrift 21: 251 (1927). – TYPE: Sweden, Västergötland, Habo, St. Kärr, on old *Fagus sylvatica* in a shaded place, 1923 Malmé (S holotype).

Syn. *Rinodina hueiana* (Harm.) H. Olivier

D: brungrå knaplav

Literature: Magnusson, Acta Horti Gothob. 17: 229–230 (1947); Tønsberg, Sommerfeltia 14: 286–288 (1992); Giralt, Mayrhofer & Obermayer, Mycotaxon 50: 50 (1994); Giralt, Mayrhofer & Sheard, Lichenologist 27: 9–11 (1995); Sheard, Herzogia 11: 118–119 (1995); Elix & Tønsberg, Graphis Scripta 10: 5 (1999).

Figs: Giralt et al. 1995: 10–11.

THALLUS areolate to subsquamulose; areolae grey-brown to green-brown or, rarely, grey-green or yellowish, scattered or rarely contiguous, irregularly rounded, flat to convex, often free from the substrate at margin, sorediate. Soralia bursting from the upper surface of the areolae, brown, greyish brown, pale green, dull greenish yellow or, rarely, distinctly yellow, minute and punctiform. Soredia farinose. Prothallus usually indistinct. APOTHECIA rare, 0.3–0.5 mm diam., lecanorine, sessile, constricted at base. Thalline margin esorediate. Disc plane, dark reddish brown to brown-black. Cortex indistinct, 10–15 µm wide. Hymenium 60–80 µm tall. Epihymenium orange-brown, granular; granules P+ orange. Hypothecium colourless. Spores *Physcia*-type, smooth, 15–20 × 8–10 µm, torus well-developed, ontogeny of type A. CONIDIOMATA not seen.

Chemistry. Areolae, soralia and thalline margin K–, C–, KC–, P+ orange. Pannarin, secalonic acid A, ± zeorin.

Habitat. Corticolous, on acidic to eutrophic bark of deciduous trees or on other corticolous lichens, and on corticolous mosses in moist habitats in coastal areas.

Distribution. Widely distributed in Norway, rare in Sweden. **D:** NJy. **N:** Ak He AA Ro Ho SF MR ST NT SNo NNo Tr VFi. **S:** Vg Vrm Vsm Upl Jmt LL. Also known from the British Isles, central Europe, the Pyrénées, and North America.

Note. Characterized by its discrete brown to yellowish soralia, the presence of pannarin and the *Physcia*-type spores.

17. *Rinodina endophragmia* I.M. Lamb

British Antarctic Survey Sci. Rep. 61: 71 (1968). – TYPE: Antarctica, East Graham Land, James Ross Island, Sidney Herbert Sound, 1945 Taylor (BM holotype).

Literature: Mayrhofer & Sheard, Bryologist 91: 108 (1988); Seppälä, Ann. Bot. Fenn. 28: 193–196 (1991).

THALLUS rimose-areolate with indistinctly lobate margins. Areolae 0.7–1.2 mm wide, or larger and verruciform, loo-

sely attached to the substrate, subsquamulose, pale to dark grey, ochraceous or brown. Prothallus absent. APOTHECIA abundant, 0.4–1.1 mm diam., immersed to broadly attached. Disc convex to semi-globose, frequently cracked in larger apothecia, black. Hymenium 70–100 µm tall. Epihymenium dark brown. Hypothecium 60–180 µm high, colourless. Spores *Bicincta*-type, swollen at septum when young, constricted when over-mature, 16–22 × 9–12.5 µm, torus absent, ontogeny of type A. CONIDIOMATA not seen.

Chemistry. Zeorin.

Habitat. Saxicolous, on calcareous rocks and on basalt, rarely on calcareous soil in arctic or alpine areas.

Distribution. Scattered in Greenland, one record from arctic Norway and one from alpine Sweden. **Gr N:** ØFi. **S:** Jmt. Also known from arctic North America (Canada, Northwest Territories and Yukon Territory) and Antarctica.

Note. Characterized by the convex to semi-globose disc and the *Bicincta*-type spores. The records of *Rinodina castanomela* from Sweden (Mayrhofer 1984: 393) and the record of *R. calcigena* from Varanger (Mayrhofer & Poelt 1979: 75) refer to *R. endophragma*.

18. *Rinodina exigua* (Ach.) S. Gray

Nat. Arr. Brit. Pl. 1: 450 (1821). – *Lichen exiguus* Ach. Lich. Suec. Prod.: 69 (1799). – TYPE: Without locality (BM-ACH lectotype, Ropin & Mayrhofer, Herzogia 9: 800, 1993).

Syn. *Rinodina kornhuberi* Zahlbr., *R. ramulicola* Kernst., *R. exigua* f. *trabicola* Arnold

D: ege-knaplav **F:** kääpiönnappijäkälä

Literature: Magnusson, Acta Horti Gothob. 17: 282–290 (1947); Sheard, Lichenologist 3: 347–348 (1967); Mayrhofer & Ropin, Herzogia 9: 799–804 (1993); Giralto & Mayrhofer, Nova Hedwigia 59: 133–134 (1994).

THALLUS thin, rimose, smooth to granulose-verrucose, whitish grey to grey. Prothallus absent. APOTHECIA abundant, often confluent, 0.3–0.7 mm diam., lecanorine, immersed to adnate. Disc plane to convex, black. Cortex of apothecial margin indistinct. Hymenium 70–90 µm tall. Epihymenium dark brown. Hypothecium 40–70 µm high. Spores *Physcia*-type, 15–20 × 7–9 µm, smooth or minutely warty, torus indistinct to well-developed, ontogeny of type A. CONIDIOMATA not seen.

Chemistry. Thallus K± yellow (sordid), C–, KC–, P± yellow (sordid). Atranorin.

Habitat. Corticolous, rarely lignicolous, on different phorophytes, most frequent on rough bark of old deciduous trees, rarely on conifers, often in association with other common nitrophilous species.

Distribution. **D:** ØJy Sjø. **Fa F:** A V U St EH ES EP PS PK Ks. **N:** Ak He Bu Vf Te SNo Tr. **S:** Sk Bl Öl Gtl Klm Bh Vg Ög Nrk Srm Vrm Upl Dlr Hls Mpd Ång Htr Jmt Vb LL. Fairly common in western and central Europe, scattered in southern Europe and northern Africa; also known from North America and Australasia.

Note. Characterized by the pale thallus, the crowded black apothecia, the indistinct cortex of the apothecial margin and the *Physcia*-type spores. The K– and P– reactions of the thallus are often indistinct due to low concentration of atranorin, but the crystals are easily detectable in polarized light (margin of apothecia or upper part of thallus).

19. *Rinodina fimbriata* Körb.

Parerg. Lichenol.: 76 (1859). – TYPE: [Poland] Hirschberg, Körber (L lectotype, Mayrhofer & Poelt, Biblioth. Lichenol. 12: 97, 1979).

Syn. *Rinodina exigua* var. *inundata* Blomb. ex Th.Fr.

Literature: Mayrhofer & Poelt, Biblioth. Lichenol. 12: 97–98 (1979); Mayrhofer, J. Hattori Bot. Lab. 55: 411 (1984).

THALLUS thick, 0.4–0.7 mm, areolate, pale grey, pale brown to grey-brown. Prothallus black. APOTHECIA scattered, 0.4–0.8 mm diam., cryptolecanorine to lecanorine and adnate. Disc plane, dark brown to black, paler when wet. Hymenium to 120 µm tall. Epihymenium reddish brown. Hypothecium to 200 µm high, colourless. Spores *Mischoblastia*-type, smooth, 22–26(–31) × 12–15(–17) µm, torus poorly developed, ontogeny of type A. CONIDIOMATA not seen.

Chemistry. No secondary substances (by TLC) in Nordic material.

Habitat. Saxicolous, on sometimes inundated or irrigated siliceous rocks in creeks and at lake shores.

Distribution. Rare. **S:** Sk Dls Nrk Vrm. Also known from very few localities in the British Isles and Central Europe.

Note. Characterized by the *Aspicilia*-like apothecia and the large *Mischoblastia*-type spores. The species was erroneously reported by Mayrhofer (1984) from Norway and Finland. The record from Finland refers to *R. deflectens*.

20. Rinodina flavosoralifera Tønsberg

Sommerfeltia 14: 288 (1992). – TYPE: Norway, Hordaland, Bergen, Store Milde, Fana Folkehøjskole, 20–40 m, on mossy trunk of *Prunus avium* in an old garden, 1988 Tønsberg 11375 (BG holotype)

Literature: Tønsberg, Sommerfeltia 14: 288–291 (1992).

THALLUS areolate. Areolae sparse, scattered, yellow to greenish or brownish yellow, at first rounded and convex, later flattened and elongate, more or less irregular in outline, sometimes ± incised, to 0.3 mm long, usually soon completely dissolved into soredia. Soralia at first punctiform, rarely marginal, discrete to confluent. Soredia loosely arranged, farinose. Prothallus absent. APOTHECIA very rare, on or between areolae, lecanorine, hemispherical to subglobose, with a pore-like opening. Disc brown. Hymenium 85–125 µm tall. Epithymenium brown. Hypothecium to 60 µm high, colourless. Spores colourless, rarely brown, 14–15 × 6–10 µm, mature spores not seen. Conidia bacilliform, 4–5 × 1 µm.

Chemistry. Thallus including soralia K–, C and KC+ persistent orange, P–; UV+ orange-red. Arthothelin, thiophanic acid.

Habitat. Corticolous, muscicolous or rarely lichenicolous on old deciduous trees in rather open situations.

Distribution. Scattered in coastal lowlands of southwestern Norway. N: AA Ro Ho SF. Also in England and Scotland.

Note. Characterized by the yellow areolae and soralia, and the presence of arthothelin and thiophanic acid. The generic position is uncertain.

21. Rinodina gennarii Bagl.

Comment. Soc. Critt. Ital. 1: 17 (1861). – Type: Italy, Liguria, Mte. Faiallo nell' Apennino di Voltri, Baglietto (MOD lectotype, Mayrhofer & Moberg, Nordic Lichen Flora 2: 72, 2002).

Syn. *Rinodina subexigua* (Nyl.) H. Olivier, *R. pallida* H. Magn., *R. salina* Degel., *R. demissa* auct., *R. demissa* f. *cinerascens* H. Magn., *R. exigua* var. *obscurata* H. Magn.

D: kyst-knaplav **F**: suolanappijäkälä **S**: kustkrimmerlav

Literature: Degelius 1939, Uppsala Univ. Årsskr 1939 (11): 192–194, (1939); Sheard, Lichenologist 3: 350–351 (1967); Mayrhofer & Poelt 1979: 98–102, Mayrhofer, J. Hattori Bot. Lab. 55: 413–416 (1984); 198, Matzer & Mayrhofer, Bothalia 26: 17–18, (1996); Trinkaus, Mayrhofer & Matzer, Australasian Lichenology 45: 15–21 (1999).

Figs: Trinkaus et al. 1999: 19.

THALLUS indistinct to thin, 0.1–0.2 mm, ± effuse, smooth to areolate, whitish to dark grey, often with an olive or brown tinge. Prothallus indistinct. APOTHECIA abundant, 0.3–0.6 mm diam., lecanorine or rarely lecideine, crowded, adnate to sessile. Proper margin sometimes present, narrow. Disc plane to strongly convex, dark brown. Hymenium 60–90 µm tall. Epithymenium dark brown. Hypothecium to 150 µm high, colourless. Spores *Dirinaria*-type, smooth or finely rugulate, (11–)13–16(–18) × (6–)7–10(11) µm, torus absent, ontogeny of type B. Conidia 4–5 × 1 µm.

Chemistry. No secondary substances (by TLC) in Nordic material.

Habitat. Mainly saxicolous, rarely lignicolous or corti-colous, on nutrient-enriched substrata, particularly siliceous rocks, mortar and concrete. Frequent both on seashore and inland localities; somewhat nitrophilous.

Distribution. Widely distributed in Denmark and southernmost Sweden, scattered in Norway, southern Finland, Iceland and on the Faeroe Islands. **D**: NJy ØJy VJy Fyn Sjø Brn. **F**: A V U EK EP. **I**: ISu IVe INv INo. **N**: Ak Ro Ho SF ST SNo NNo ØFi. **S**: Sk Bl Öl Gtl SmI HI Bh Vg Ög Srm Vrm Vsm Upl. Widespread in cool temperate and temperate areas of both hemispheres (Europe, Asia, North America, South America, North Africa, South Africa, Australasia).

Note. Characterized by the *Dirinaria*-type spores and the numerous, often crowded, small apothecia. The specimen from Finnmark was reported as *Rinodina interpolata* by Mayrhofer & Poelt (1979).

22. Rinodina griseosoralifera Coppins

Lichenologist 21: 169 (1989). TYPE: Scotland (Caledonia), Berwickshire, Duns Park, 1981 Fox (E holotype).

Literature: Coppins, Lichenologist 21: 169–172 (1989); Tønsberg, Sommerfeltia 14: 290–292 (1992); Giralt, Mayrhofer & Sheard, Lichenologist 27: 19–20 (1995); Sheard, Herzogia 11: 119–120 (1995).

THALLUS effuse, areolate, sorediate. Areolae scattered to contiguous, dull greenish white to pale grey or greyish brown, sometimes subsquamulose, usually inconspicuous and often obscured by soralia. Soralia numerous, discrete, convex, blue-grey (fading in herbarium material). APOTHECIA rare, 0.3–0.4 mm diam., lecanorine, sessile, ± globose, opening usually poriform, 0.15 mm. Thalline margin distinct, raised, sometimes sorediate, cortex indistinct.

Proper margin brown, narrow. Hymenium to 125 µm tall. Epihymenium brown. Hypothecium to 40 µm high, colourless. Spores *Pachysporaria*-type, 18–30 × 10–16 µm, torus well-developed. CONIDIOMATA not seen.

Chemistry. Thallus and soralia K⁺ yellow, C⁻, KC⁻ P⁺ faint yellow. Atranorin, zeorin.

Habitat. Corticolous, on eutrophic, smooth bark in coastal habitats.

Distribution. Only known from south-western Norway. N: VA Ro Ho SF. Otherwise known from the British Isles, central Europe and western North America.

Note. Characterized by the discrete, blue-grey soralia, the presence of atranorin and zeorin, and the *Pachysporaria*-type spores.

23. *Rinodina immersa* (Körb.) Zahlbr.

Sitzber. Kais. Akad. Wiss. Wien, Math.-Naturw. Cl. 115: 522 (1906). – *Rinodina bischoffii* var. *immersa* Körb., Parerg. Lichenol.: 75 (1859). – TYPE: [Germany, Bavaria] Ad lapides calcareos (Solnhofener Formation) montium sterilium prope Eichstätt, F. Arnold, Körber, Lich. sel. Germ. exs. 127 (ZT lectotype, Mayrhofer & Moberg, Nordic Lichen Flora 2: 72, 2002).

Literature: Mayrhofer & Poelt, Biblioth. Lichenol. 12: 104–108 (1979); Mayrhofer, J. Hattori Bot. Lab. 55: 423–425 (1984); Giralt et al., Mycotaxon 61: 128–129 (1997).

THALLUS endolithic or epilithic, inconspicuous, whitish to pale grey. APOTHECIA abundant, to 1 mm diam., immersed in depressions of the substrate, rarely ± adnate, pseudo-lecanorine. Disc plane to slightly convex, dark brown to black. Proper margin concolorous or paler than disc, thin, usually persistent. Hymenium 80–100 µm tall, without oil droplets. Epihymenium dark brown. Hypothecium to 100 µm high, colourless. Spores *Bischoffii*-type, often poorly developed, finely rugulate, 14–21 × 9–12 µm, torus absent, ontogeny of type A. CONIDIOMATA not seen.

Chemistry. No secondary substances (by TLC) in Nordic material.

Habitat. Saxicolous, on dry and sunny surfaces of horizontal or sloping hard calcareous rocks. Apothecia immersed in deep depressions of the substrate.

Distribution. Scattered in southern Sweden. S: Öl Gtl Vg Ög NrK Upl Gst. Widespread on calcareous rocks in temperate regions of both hemispheres (Europe, Asia, North

America, North Africa, Australasia).

Note. Characterized by the immersed apothecia and the *Bischoffii*-type spores.

24. *Rinodina insularis* (Arnold) Hafellner

Beih. Nova Hedwigia 62: 87 (1979). – *Buellia saxatilis* f. *insularis* Arnold, Verh. Zool.-Bot. Ges. Wien 46: 119 (1896). – TYPE: [Italy] Südtirol, Gröden, Augitporphyr ober Plan gegen das Sellajoch, 1895 Arnold (M holotype).

Literature: Hafellner, Beih. Nova Hedwigia 62: 87–89 (1979); Mayrhofer & Poelt, Biblioth. Lichenol. 12: 108–109 (1979); Mayrhofer, J. Hattori Bot. Lab. 55: 425–426 (1984); Hafellner, Herzogia 9: 756 (1993); Giralt & Llimona, Mycotaxon 62: 197–198 (1997).

Parasitic on *Lecanora rupicola* (coll.) forming orbicular patches. THALLUS areolate. Areolae small, pale brown. APOTHECIA formed prior to the thallus, scattered, 0.2–0.5 mm diam., lecideine, immersed in the thallus of the host. Disc plane to slightly convex, black. Hymenium 50–70 µm tall. Epihymenium dark brown. Hypothecium brown. Asci of *Bacidia*-type. Spores *Dirinaria*-type, strongly warty, 11–17 × 5.5–9 µm, torus absent, ontogeny of type B. CONIDIOMATA not seen.

Chemistry. No secondary substances (by TLC) in Nordic material.

Habitat. Lichenicolous on *Lecanora rupicola* (coll.) on siliceous rocks.

Distribution. Rare in southern central Norway. N: Op. Scattered in central and southern Europe and the Canary Islands, rare in North America and Australasia.

Note. Characterized by its parasitic growth, the small lecideine apothecia with a brown hypothecium, the *Bacidia*-type asci and the small *Dirinaria*-type spores.

25. *Rinodina interpolata* (Stirt.) Sheard

Lichenologist 5: 461 (1973). – *Lecidea interpolata* Stirt., Scott. Naturalist 4: 165 (1877–78). – TYPE: Scotland, Ross, Garvie, 1887 Stirtor (BM holotype).

Syn. *Rinodina diplocheila* sensu H.Magn. p. p., *R. diplocheila* f. *caesiascens* H.Magn., *R. diplocheila* f. *luxurians* H.Magn.

Literature: Sheard, Lichenologist 5: 461 (1973); Mayrhofer & Poelt, Biblioth. Lichenol. 12: 109–111 (1979); Mayrhofer, J. Hattori Bot. Lab. 55: 426–427 (1984).

THALLUS thin to moderately thick, 0.1–0.5 mm, rimose to rimose-areolate or verrucose to squamulose, pale grey to dark brown. Prothallus black. APOTHECIA abundant, discrete, rarely contiguous, 0.3–0.5 mm diam., lecanorine to pseudolecanorine, broadly attached to sessile. Disc plane to slightly convex, dark brown to black. Margin sometimes crenulate. Hymenium to 80 µm tall. Epihymenium reddish brown. Hypothecium to 150 µm high, colourless. Spores *Physcia*-type to *Physconia*-type, narrowly ellipsoid, rugulate, (14–)15–17(–20) × (6–)7–8(–9) µm, torus poorly developed, ontogeny of type A. CONIDIOMATA not seen.

Chemistry. ± Zeorin.

Habitat. Saxicolous, on hard siliceous rocks, usually on sheltered and shaded, vertical or overhanging cliffs and boulders.

Distribution. Scattered in Sweden, rare in Norway, Finland, Denmark and Iceland. **D:** Brn. **F:** V. **I:** INv. **N:** VA Ro Ho. **S:** Sk Klm Hl Bh Dls Vg Nrk Srm Vrm Hls Mpd LL. Also known from the British Isles and central Europe.

Note. Characterized by its brown thallus, and the narrowly ellipsoid *Physcia*-type to *Physconia*-type spores. The species has often been confused with *Rinodina occulta* which contains atranorin and has ellipsoid *Physcia*-type spores. The reports from Nordland, Finnmark and from Nylandia (Mayrhofer 1984) refer to *Rinodina gennarii*, and records from neighbouring parts of Russia (Mayrhofer 1984) refer to *R. tephraspis*.

26. *Rinodina isidioides* (Borrer) H. Olivier

Mem. Soc. Sci. Nat. Cherbourg 37: 186 (1909). – *Parmelia isidioides* Borrer ex Hook. & Sowerby, Suppl. Engl. Botany 3: tab. 2808 (1843). – TYPE: Wales, Cwm Bychan, 1835 Salwey (BM lectotype, Mayrhofer & Moberg, Nordic Lichen Flora 2: 72, 2002).

Literature: Sheard, Lichenologist 3: 357–358 (1967); Tønberg, Graphis scripta 6: 87 (1994); Giralt, Mayrhofer & Sheard, Lichenologist 27: 14–15 (1995).

THALLUS consisting of numerous coralloid, long, cylindrical and thin isidia, free or mostly united at the base into a subsquamulose structure, whitish, pale whitish grey or greyish green, isidia tips often brownish. APOTHECIA scattered, 0.7–1.0 mm diam., lecanorine, sessile. Disc plane, black. Cortex of the apothecial margin I–, cellular, to 30–50 µm below. Hymenium 100–150 µm tall. Epihymenium reddish brown. Hypothecium to 100 µm high. Spores *Pachysporaria*-type, 20–30 × 12–16 µm, torus well-developed,

ontogeny of type A. CONIDIOMATA not seen.

Chemistry. Thallus K+ yellow, C–, P+ yellow. Atranorin, zeorin (traces).

Habitat. Corticolous or muscicolous on the trunks of old *Quercus*.

Distribution. Known only from southwestern Norway. **N:** Ro Ho. Rare in the British Isles and in western France, scattered at Atlantic sites in the western and northwestern part of the Iberian Peninsula. Also known from Kenya.

Note. Characterized by the long and cylindrical isidia, the large *Pachysporaria*-type spores and the presence of atranorin (K+ yellow).

27. *Rinodina laevigata* (Ach.) Malme

Bih. Kongl. Svenska Vet.-Akad. Handl. 21(III/11): 25 (1895). – *Lecanora sophodes* var. *L. laevigata* Ach., Lich. Univ. 357 (1810). – TYPE: Without locality (H-ACH 1178A lectotype, Mayrhofer & Moberg, Nordic Lichen Flora 2: 72, 2002) (Acharius 1178 consists of three specimens, the specimen from Lusatia refers to *R. convexula*, the specimen from Silesia probably to *R. albana*, the remaining small sample is chosen as lectotype).

D: nordisk knaplav

Literature: Magnusson, Acta Horti Gothob. 17: 243–246 (1947)..

THALLUS very thin, mainly consisting of pale brown to brown, dispersed areolae. Prothallus indistinct to dark brown. APOTHECIA abundant, 0.4–0.8 mm diam., lecanorine, broadly attached to sessile. Disc plane to slightly convex, brown to black. Cortex of the apothecial distinct, 50–70 µm thick, consisting of dense intricate hyphae, I–. Hymenium 80–100 µm tall. Epihymenium red-brown. Hypothecium to 100 µm high, colourless. Spores *Physcia*-type, smooth to minutely warted, 16–20 × 7–9 µm, torus well-developed, ontogeny of type A. CONIDIOMATA not seen.

Chemistry. No secondary substances (by TLC) in Nordic material.

Habitat. Corticolous, on smooth-barked deciduous trees, rarely on *Juniperus* or lignicolous.

Distribution. Rare in Norway, scattered in Sweden and Finland. **F:** V U St EH KP Kn PeP EnL. **N:** Ak NNo. **S:** Sml Dls Ög Nrk Srm Vsm Upl Dlr Gst Hls Mpd Ång Jmt. Also known from neighbouring parts of Russia and Scotland.

Note. Characterized by its dark thallus, the thick cortex of the apothecial margin (composed of dense intricate hyphae) and the *Physcia*-type spores. Records of *R. plana* in Foucard (2001) refer to this species.

28. *Rinodina lecanorina* (A.Massal.) A.Massal.

Geneac. Lich.: 19 (1854). – *Mischoblastia lecanorina* A. Massal., Rich. Lich. Crost.: 41 (1852). – TYPE: Italy, Lombardia, Prov. Verona, Lovenò, Garovaglio (VER lectotype, Mayrhofer & Poelt, Biblioth. Lichenol. 12: 127, 1979).

Syn. *Rinodina ocellata* (Hoffm.) Arnold

Literature: Mayrhofer & Poelt, Biblioth. Lichenol. 12: 127–131 (1979); Mayrhofer, J. Hattori Bot. Lab. 54: 429–432 (1984); Mayrhofer Scheidegger & Sheard, Biblioth. Lichenol. 38: 335–346 (1990); Giralt & Llimona, Mycotaxon 62: 199–200 (1997).

Figs: Wirth 1995: 835.

THALLUS thick (to 3 mm), effuse, areolate. Areolae 0.6–1.5 mm wide, contiguous, plane or somewhat convex, grey, dark grey or more rarely brown. Prothallus absent. APOTHECIA abundant, 0.5–1.0 mm diam., cryptolecanorine to slightly raised above the surface, usually several per areola. Disc plane, rough, black. Hymenium 80–120 µm tall. Epithymenium red-brown. Hypothecium 80–150 µm high, colourless to pale yellow-brown. Spores *Bicineta*-type, walls finely rugulate, 13–20 × 7.5–12 µm, torus absent, ontogeny of type A. Conidia bacilliform, 6–8 × 1–1.5 µm.

Chemistry: Zeorin

Habitat. Saxicolous, on calcareous rocks in more or less open situations in warm-temperate sites.

Distribution. Scattered on Öland and Gotland, rare in other parts of southern Sweden. S: Öl Gtl Vg. Common in warm-temperate localities throughout central Europe, scattered in southern Europe, northern Africa, Asia Minor and central Asia.

Note. Characterized by the thick, areolate, dark grey thallus, the immersed apothecia and *Bicineta*-type spores, significantly larger than in the related *Rinodina luridata*.

29. *Rinodina luridata* (Körb.) H. Mayrhofer, Scheid. & Sheard

Biblioth. Lichenol. 38: 346 (1990). – *Buellia luridata* Körb., Parerga Lichenol.: 188 (1860). – TYPE: [Germany, Bavaria] Bissingen im Oberamt Ulm, Kemmler (L holotype).

Syn. *Rinodina euryspora* Zahlbr., *R. iodes* H. Mayrhofer & Poelt var. *iodes*, *R. iodes* var. *immersa* H. Mayrhofer & Cl. Roux

Literature: Mayrhofer Scheidegger & Sheard, Biblioth. Lichenol. 38: 346–352 (1990); Giralt & Llimona, Mycotaxon 62: 200–202 (1997).

THALLUS indistinct, endolithic to epilithic, thin, inconspicuous or sometimes well developed, cracked-areolate to areolate. Areolae contiguous, 0.5–0.8 mm wide, plane, smooth or somewhat rugose, greyish to ochraceous or brown. Prothallus absent. APOTHECIA abundant, 0.3–0.6 mm diam., ± immersed in depressions in the substrate to sessile, lecanorine. Disc concave to slightly convex, dark brown to black, often covered by a fine, whitish grey pruina. Hymenium 70–100 µm tall. Epithymenium reddish brown. Hypothecium 70–90 µm high, light yellowish brown. Spores *Bicineta*-type, 10–16 × 6.5–11 µm, torus absent, ontogeny of type A. CONIDIOMATA not seen.

Chemistry: Zeorin.

Habitat. Saxicolous, on calcareous rocks, mainly in upland areas.

Distribution. Rare in central and southern Norway and southern Sweden. N: Ak ST. S: Öl Vg. Scattered in upland areas and in the mountains of central and southern Europe, also known from Northern Africa, North America, Australia and New Zealand.

Note. Characterized by the indistinct to thin, areolate, ochraceous thallus, the immersed to sessile, often pruinose apothecia and the *Bicineta*-type spores, smaller than in the related *Rinodina lecanorina*.

30. *Rinodina luridescens* (Anzi) Arnold

Flora 55: 39 (1872). – *Buellia luridescens* Anzi, Comment. Soc. Critt. Ital. 1(3): 158 (1862). – Type: [Italy, Toscana] Monte Pisano, Anzi, Lich. Rar. Etr. Exs. No. 20 (UPS lectotype, Mayrhofer & Moberg, Nordic Lichen Flora 2: 72, 2002).

Syn. *Buellia steineri* Servit, *Rinodina coniopta* (Nyl.) Hav., *R. sciodes* (Nyl.) H. Olivier

Literature: Sheard, Lichenologist 3: 348–349 (1967); Mayrhofer & Poelt, Biblioth. Lichenol. 12: 114–116 (1979); Mayrhofer, J. Hattori Bot. Lab. 55: 433–434 (1984); Giralt & Barbero, Mycotaxon 56: 62–64 (1995).

THALLUS thick, 0.5–1 mm, rimose to cracked-areolate. Areolae 1.2–2.7 mm wide, grey-brown to black-brown. Prothallus black. APOTHECIA few to abundant, 0.8–1.5 mm diam., pseudolecanorine, immersed. Disc flat to slightly convex, black. Hymenium to 150 µm tall. Epithymenium reddish brown. Hypothecium 70–150 µm high, pale brown. Spores *Physconia*-type or *Milvina*-type, warty, 15–23 × 8–12 µm, torus well-developed, ontogeny of type A. CONIDIOMATA not seen.

Chemistry. Thallus C+ faintly red. Epithymenium and proper margin C+ red (microscope!). Gyrophoric acid (with lecanoric and orsellinic acids), zeorin. (Hypostictic acid present in some collections from the Mediterranean region).

Habitat. Saxicolous, on hard, maritime siliceous rocks.

Distribution. Rather frequent in southwestern Norway and southern Sweden, rare in Denmark. **D:** Brn. **N:** Øf Vf Ro Ho SF ST SNo. **S:** Sk Bl Hl Bh Vg Ög Upl. Widely distributed at maritime sites in western British Isles, western and southern Europe, northern Africa and Asia minor.

Note. Characterized by its thick grey to black-brown thallus and the large immersed pseudolecanorine apothecia.

31. *Rinodina malangica* (Norman) Arnold

Flora 64: 196 (1881). – *Rinodina leprosa* * *malangica* Norman, Kongel. Norske Vidensk. Selsk. Skr. 5: 342 (1868). – TYPE: [Norway, Troms] ad Moen, convallis Maalselven [Målselv], Norman (O lectotype, Mayrhofer & Moberg, Nordic Lichen Flora 2: 72, 2002).

Syn. *Rinodina rhododendri* Hepp ex H. Magn.

Literature: Grummann, Cat. Lich. Germ.: 23 (1963); Hinteregger, Mayrhofer & Poelt, Mitt. Naturwiss. Vereins Steiermark 119: 92–98 (1989); Ropin & Mayrhofer, Herzogia 9: 810–812 (1993); Hinteregger, Biblioth. Lichenol. 55: 287–289 (1994); Giralt, Mayrhofer & Sheard, Lichenologist 27: 15–16 (1995).

THALLUS well-developed, ochraceous to greenish brown, blastidiate to leprose. Blastidia coralloid, to 50–60 µm diam. Prothallus indistinct. APOTHECIA scattered, 0.5–0.8 mm diam., lecanorine, immersed to broadly attached. Disc plane to slightly convex, brown to blackish brown. Cortex of apothecial margin indistinct, to 30 µm thick. Hymenium 70–100 µm tall. Epithymenium reddish brown. Hypothecium 50–100 µm high, colourless. Spores *Physcia*-type, 13–18 × 6–9 µm torus well-developed, ontogeny of type A. CONIDIOMATA not seen.

Chemistry. No secondary substances (by TLC) in Nordic material.

Habitat. Lignicolous, on decaying wood of *Alnus* in northern Norway; in the Alps it occurs relatively frequently on the bark of *Rhododendron ferrugineum* and occasionally on *Rh. hirsutum* and on *Alnus alnobetula*.

Distribution. Known only from the type locality. **N:** Tr. Also known from the Alps and the Atlantic Pyrénées.

Note. Characterized by the brown blastidiate to leprose thallus and the *Physcia*-type spores.

32. *Rinodina metaboliza* Vain.

Ann. Acad. Sci., ser. A, 27: 87 (1928). – TYPE: Siberia, Tobolsk, Levusch, on *Salix*, 1880 Vainio (TUR-V 8940 holotype).

Syn. *Rinodina metaboliza* f. *evoluta* H. Magn., *Rinodina norrlandica* H. Magn.

Literature: Magnusson, Acta Horti Gothob. 17: 296–297 (1947)..

THALLUS indistinct or thin, verrucose to areolate, pale brownish grey. Prothallus dark brown. APOTHECIA abundant, 0.2–0.4 mm diam., broadly attached, lecanorine, sometimes with crenulate margins. Cortex of apothecial margin present, rather variable in thickness. Spores *Dirinaria*-type, swollen at septum, swellings increasing in K, 17–20 × 7–10 µm, torus absent, ontogeny of type B. CONIDIOMATA not seen.

Chemistry. No secondary substances (by TLC) in Nordic material.

Habitat. Corticolous, on deciduous trees.

Distribution. Rare in central Sweden and central Norway. **N:** Op. **S:** Mpd Hrj Jmt. Also known from Karelia and Siberia.

Note. Characterized by its *Dirinaria*-type spores with median swellings increasing in K. The report of *Rinodina granulans* Vain. (Santesson 1993, Foucard 2001) from Sweden refers to the type material of *Rinodina norrlandica* which belongs to this species. The record of *Rinodina consocians* H. Magn. from northern Finland (Magnusson 1947) also refers to this species.

33. *Rinodina milvina* (Wahlenb.) Th. Fr.

Lichenes Arctoi: 124 (1861). – *Parmelia milvina* Wahlenb. in Acharius, Methodus Suppl.: 34 (1803). – TYPE: Norway, Finnmark, Jansnåset ad Talviig [Jansnes, Talvik], 29.V.1802 Wahlenberg (UPS holotype).

Syn. *Rinodina milvina* var. *karelica* Räsänen, *R. milvina* var. *scopulina* (Nyl.) H. Olivier, *Lecanora sophodes* var. *submilvina* Nyl., *R. arnoldii* auct. (non H. Mayrhofer & Poelt)

F: kivinappijäkälä **S:** krimmerlav

Figs: Moberg & Holmåsén 1990: 196.

Literature: Mayrhofer & Poelt, Biblioth. Lichenol. 12: 117–122 (1979); Mayrhofer, J. Hattori Bot. Lab. 54: 436–439 (1984); Giralt & Llimona, Mycotaxon 61: 202–203 (1997).

THALLUS thin to thick, smooth to rough, rimose-areolate to areolate, greyish or reddish brown to dark brown. Prothallus dark brown to brownish black. APOTHECIA abundant, to 1 mm diam., lecanorine, crowded, slightly immersed to adnate, rarely sessile. Margin prominent. Disc concave to plane, rarely slightly convex, dark brown to black. Hymenium 90–120 µm tall. Epithymenium reddish brown. Hypothecium to 200 µm high, colourless. Spores *Milvina*-type, occasionally *Pachysporaria*-type when mature, often constricted at septum, finely rugulate, 14–22 × 7–12 µm, torus well-developed, ontogeny of type A. Conidia bacilliform, 4–5 × 1 µm.

Chemistry. No secondary substances (by TLC) in Nordic material. The lower part of the thallus are often red to dark brown, giving a red solution in K.

Habitat. Saxicolous, on open siliceous or slightly calciferous rocks (amphibolites, gneiss, schist etc.), usually on horizontal to slightly sloping surfaces from seashore to inland localities. Occasionally parasitic on other crustose lichens.

Distribution. Scattered in Norway, central and northern Sweden and Finland. **Gr F:** V U EK St LK EP PK OP PeP Ks EnL InL. **N:** Op AA Ho ST SNo Tr VFi ØFi. **S:** Öl Vg Ög NrK Srm Vrm Vsm Upl Dlr Gst Hls Mpd Ång Hrj Jmt LyL LL TL. Rare in Scotland, widely distributed in the mountains of central and southern Europe, North Africa, Asia and North America.

Note. Characterized by the well-developed, areolate, grey-brown to reddish-brown thallus, the blackish prothallus and the large *Milvina*-type spores. The specimens reported as

Rinodina arnoldii H. Mayrhofer & Poelt from Norway and Sweden refer to *R. milvina*.

34. *Rinodina mniaraea* (Ach.) Körb.

Syst. Lich. Germ.: 126 (1855). – *Lecanora 'mniaroea'* Ach., Syn. Lich. 339 (1814). – TYPE: [Switzerland] Helvetia, Schleicher 91a (H-ACH 1136A lectotype, Mayrhofer & Moberg, Nordic Lichen Flora 2: 72, 2002).

Syn. *Rinodina mniaraea* var. *normalis* Th. Fr., *R. mniaraeoides* (Nyl.) H. Olivier, *R. amniocola* (Ach.) Körb., *R. turfacea* var. *nuda* Körb.

F: sammalnappijäkälä **S:** fjällkrimmerlav

Literature: Magnusson, Acta Horti Gothob. 17: 252–255 (1947); Timpe, Diplomarbeit, Graz 1991: 89–108 (ined.); Giralt, Mayrhofer, van den Boom & Elix, Lichenologist 33: 100 (2001).

THALLUS thin to thick, effuse, smooth to verrucose, con-ti-nuous, pale brown to brown or reddish brown. Prothallus absent. APOTHECIA often abundant, 0.4–1.5 mm diam., lecanorine, subimmersed to broadly attached. Disc rarely pruinose, plane to convex, dark brown. Cortex of apothecial margin absent or indistinct. Hymenium 110–170 µm tall. Epithymenium brown. Hypothecium 150–200 µm high, brown at base, oil droplets present in older apothecia. Spores *Physcia*-type, 20–34 × 9–15 µm, torus well-developed, ontogeny of type A. Conidia bacilliform, 4–5 × 1 µm.

Note. Characterized by the large and often convex apo-the-cia, the high hypothecium, the indistinct or even absent cortex of the apothecial margin and the large *Physcia*-type spores.

Key to the varieties

- 1 Medulla orange or yellow, K+ violet var. *cinnamomea*
- Medulla not orange or yellow, K+ yellow or K– 2
- 2 Thallus whitish, K+ yellow, atranorin var. *mniaraeiza*
- Thallus darker, K– var. *mniaraea*

34a. var. *mniaraea*

For differences from the other varieties, see below.

Chemistry. ± Variolaric acid, ± unidentified triterpenoid.

Habitat. Muscicolous or on decaying plants, rarely lignum, mainly in arctic-alpine, rarely subalpine or boreal sites.

Distribution. Common in arctic-alpine Norway and Sweden and the Arctic Islands, rare in Greenland, Iceland, Finland and boreal Norway and Sweden. **Gr F:** EH LK Kn OP Ks EnL. **I:** IMi I Au INo. **N:** Ak He Op Bu Te Ho MR ST NT SNo NNo Tr VFi ØFi. **AI:** Bi Sb. **S:** Ög Vsm Upl Dlr Mpd Hrj Jmt Vb ÅsL LyL PL LL TL. Scattered in the Alps and the Carpathian Mountains, rare in the Pyrenees and in the Rocky Mountains of North America, scattered in the mountains of Central Asia, the Himalayan Mountains and in Siberia.

Note. Distinguished from var. *cinnamomea* by the absence of the yellow to orange pigment in the medulla and from var. *mniaeraeiza* by the absence of atranorin.

34b. var. cinnamomea Th. Fr.

Nova Acta Regiae Soc. Sci. Upsal. 3(3): 228 (1860). – TYPE: Norway, Finnmark: Syd-Varanger, Ö Pasvik [Pasvik], 22.8.1857, Th. Fries (UPS lectotype, Mayrhofer & Moberg, Nordic Lichen Flora 2: 72, 2002).

Syn. *Rinodina mniaraea* var. *chrysopasta* (Lett.) Zahlbr.

Literature: Magnusson, Acta Horti Gothob. 17: 255–256 (1947); Timpe, Diplomarbeit, Graz 1991: 118–134 (ined.); Ertl, Diplomarbeit, Graz 2000: 101–104 (ined.); Giralt, Mayrhofer, van den Boom & Elix, Lichenologist 33: 100 (2001).

THALLUS rather thick, granular-verrucose, continuous, brown to reddish brown, rarely whitish. Medulla yellow to orange, K+ purple. APOTHECIA often abundant.

Chemistry. Orange to yellow pigment in medulla reacting K+ violet to purple.

Chemotype A: Skyrin, ± variolaric acid, ± *cinnamomea* unknown (5/3/5).

Chemotype B: 1-O-methylemodin or 8-O-methylemodin, variolaric acid (not always), ± *cinnamomea* unknown (5/3/5).

Chemotype C: Skyrin, atranorin.

Chemotype D: 1-O-methylemodin or 8-O-methylemodin, atranorin, ± variolaric acid.

Habitat. Muscicolous or on decaying plants.

Distribution. Scattered in arctic-alpine Norway and Sweden, rare in Greenland, Iceland, on the Arctic Islands and Finland. **Gr F:** EH Ks EnL. **I:** IMi. **N:** He Op Te Ho ST Tr VFi ØFi. **AI:** Bi Sb. **S:** Hrj Jmt ÅsL LyL PL LL TL. Rare in NW Scotland, scattered in the Alps and the Carpathian mountains, Kola Peninsula, Siberia, Tibet and in the Himalayan mountains, rare in the Rocky Mountains, Turkey and the Caucasus mountains.

Note. Characterized by the yellow to orange medulla (anthra-quinones).

34c. var. mniaraeiza (Nyl.) H. Magn.

Acta Horti Gothob. 17: 256 (1947). – *Lecanora mniaraeiza* Nyl., Flora 53: 33 (1870). – TYPE: Finland, Tavastia australis, Padasjoki, 1866 Norrlin (H-NYL 28734 lectotype, Mayrhofer & Moberg, Nordic Lichen Flora 2: 72, 2002).

Syn. *Rinodina mniaraea* f. *biatorina* (Nyl.) Arnold, *R. hookeri* (Fr.) Dalla Torre & Sarth., *Diploicia muscorum* sensu A. Massal.

Literature: Magnusson, Acta Horti Gothob. 17: 256–257 (1947); Timpe, Diplomarbeit, Graz 1991: 109–117.

THALLUS continuous, thin, effuse, granular-verrucose, smooth, whitish, rarely pale brown to brown. APOTHECIA abundant. Spores *Phycia*-type, 20–32 × 9–15 µm, torus well-developed, ontogeny of type A. Conidia bacilliform, 4–5 × 1 µm.

Chemistry. Thallus K+ yellow. C–, P+ yellow. Atranorin, ± variolaric acid.

Habitat. Muscicolous or on decaying plants predominantly over calcareous soil.

Distribution. Common in arctic-alpine Norway and Sweden, rare in boreal Norway and boreal Sweden, Finland, Greenland and Svalbard. **Gr F:** V EH PK KP Kn PeP Ks EnL. **N:** He Op Bu Te ST Tr VFi ØFi. **AI:** Sb. **S:** Vsm Upl Hrj ÅsL LyL PL LL TL. Rare in Scotland, scattered in the Alps and the Carpathian Mountains, rare in the Rocky Mountains of North America, Turkey and the Karakorum Mountains.

Note. Characterized by the whitish K+ yellow thallus (atranorin).

35. Rinodina muscicola H. Magn.

Acta Horti Gothob. 17: 234 (1947). – TYPE: Finland, Tavastia australis, Hollola, 1871, E. Lang (H-NYL 28445 holotype, labelled as *Lecanora sophodes* *laevigata f. *muscicola*).

Literature: Magnusson, Acta Horti Gothob. 17: 234–235 (1947).

THALLUS forming a very thin cover on decaying mosses, minutely granulose, pale brown. Medulla yellowish brown. APOTHECIA abundant, 0.3–0.5 mm diam., lecideine, sessile, often confluent and indistinctly delimited. Disc plane to slightly convex, black. Exciple olive brown in outer parts, pale in inner parts. Hymenium 80–90 µm tall. Epiphyme-

nium brown. Hypothecium to 50 µm high, hyaline to yellowish. Spores *Physcia*-type, smooth, 17–21 × 9–11 µm, torus present, ontogeny of type A. Conidia bacilliform, 3–3.5 × 0.7 µm according to Magnusson (1947).

Chemistry. Medulla and lower part of apothecia K⁺ intensely violet red.

Habitat. Muscicolous, on decaying mosses.

Distribution. Known only from the type locality. **F:** EH.

Note. Characterized by the lecideine apothecia, the yellowish brown K⁺ violet red medulla and the *Physcia*-type spores.

36. *Rinodina occulta* (Körb.) Sheard

Lichenologist 3: 349 (1967). – *Buellia occulta* Körb., Parerg. Lich.: 186 (1860). – Type: Poland, Wolfsschlucht, Kynast, Körber, Lich. Sel. Germ. Exs. No 34 (M lectotype, Mayrhofer & Moberg, Nordic Lichen Flora 2: 72, 2002).

Syn. *Rinodina diplocheila* Vain. ex H. Magn., *R. verrucarioides* H. Magn

Literature: Sheard, Lichenologist 5: 462–463 (1973); Mayrhofer & Poelt, Biblioth. Lichenol. 12: 125–127 (1979); Mayrhofer, J. Hattori Bot. Lab. 54: 444–445 (1984); Giralt & Barbero, Mycotaxon 56: 64–66 (1995).

THALLUS thin, membranous, areolate or rarely rimose, whitish grey, pale brown to ochraceous. Prothallus black or absent. APOTHECIA abundant, to 0.3 mm diam., lecanorine and immersed to pseudolecanorine and adnate. Disc flat to convex, black. Hymenium to 80 µm tall. Epihymenium dark brown. Hypothecium to 60 µm high, colourless. Spores *Physcia*-type to *Physconia*-type, finely rugulate 12–15(–16) × (6–)7–8(–9) µm, torus poorly developed, ontogeny of type A. CONIDIOMATA not seen.

Chemistry. K⁺ yellow, P⁺ yellowish (reaction often indistinct but crystals easily visible with polarization). Atranorin, ± chloroatranorin.

Habitat. Saxicolous, on hard siliceous rocks in more or less open situations but with a preference for steep or overhanging faces.

Distribution. Abundant in southwestern Norway and southwestern Sweden, rare in Central Sweden and one locality in southern Finland. **F:** EK. **N:** VA Ro Ho SF MR

ST. **S:** Sk Klm Hl Bh Dls Vg Ög Nrk Vrm. Scattered in the British Isles, in western and southern Europe, rare in Central Europe. Also known from Australia.

Note. Characterized by the thin, pale thallus, the presence of atranorin, the small, adnate apothecia and the small *Physcia*-type to *Physconia*-type spores.

37. *Rinodina olivaceobrunnea* C.W. Dodge & G.E. Baker

Ann. Missouri Bot. Gard. 15: 659 (1938). – TYPE: Antarctica: Marie Byrd Land, Edsel Ford Range, Skua Gull Peak, 1934 Siple, & Corey 72W-13 (FH holotype).

Syn. *Rinodina archaeoides* H. Magn., *R. soresicola* Degel.

Literature: Magnusson, Acta Horti Gothob. 17: 278–279; Filson, Muelleria 3: 119–121 (1975); Jacobsen & Kappen, Lichenologist 21: 173–177 (1989).

THALLUS inconspicuous, tiny, brown to grey-brown. APOTHECIA abundant, 0.2–0.7 mm, lecanorine, constricted at base. Disc plane to slightly convex, dark brown. Cortex of apothecial margin 20–40 µm, I–. Hymenium 70–90 µm tall. Epihymenium brown. Hypothecium 15–50 µm high, colourless. Spores *Physcia*-type, 16–25 × 6–10 µm, torus well-developed, ontogeny of type A. CONIDIOMATA not seen.

Chemistry. ± Zeorin, ± pannarin.

Habitat. Muscicolous or on decaying plants, rarely terricolous, lignicolous or lichenicolous (on *Lobaria scrobiculata*). Often associated with *R. turfacea*.

Distribution. Arctic-alpine species. Scattered in northern and central Norway, Sweden and Finland. **Gr F:** EH Ks. **I:** IMi. **N:** Op ST NT Tr VFi ØFi. **AI:** JM Bi. **S:** Hrj Jmt LL TL. Scattered in the mountains of central and southern Europe, central Africa, Australasia and in Siberia and Antarctica.

Note. Characterized by the inconspicuous thallus, the small apothecia, the distinct cortex of the apothecial margin and the *Physcia*-type spores.

38. *Rinodina oxydata* (A. Massal.) A. Massal.

Geneac. Lich.: 19 (1854). – *Mischoblastia oxydata* A. Massal., Ric. Lich. Crost.: 42 (1852). – TYPE: Italy, Prov. Verona: In oppido Lavagno, A. Massalongo (VER holotype).

Syn. *Rinodina biatorina* Körb., *R. candida* (Schaer.) Arnold,

R. concava de Lesd., *R. contribuens* (Nyl.) Boistel, *R. discolor* (Hepp) Arnold, *R. dissimilis* Anzi, *R. intuta* (Nyl.) H. Olivier, *R. lecidotropa* (Nyl.) Zahlbr., *R. subarenaria* A.L. Sm.

Literature: Mayrhofer & Poelt, *Biblioth. Lichenol* 12: 132–137 (1979); Mayrhofer, *J. Hattori Bot. Lab.* 55: 446–449 (1984); Rambold et al., *Pl. Syst. Evol.* 192: 33–38 (1994); Giralt & Barbero, *Mycotaxon* 56: 66–68 (1995); Matzer & Mayrhofer, *Bothalia* 26: 21–23 (1996); Mayrhofer in Marbach, *Biblioth. Lichenol.* 74: 342–342 (2000).

THALLUS thin (to 0.3 mm), rimose to areolate, sordid white, grey-ochraceous to pale brown. Prothallus often present, black. APOTHECIA abundant, 0.3–0.8 mm diam., lecanorine and ± immersed to pseudolecanorine and adnate. Thalline margin concolorous with thallus, thin, usually excluded. Proper exciple in its outer layer with an olivaceous, blue-green to blackish, N+ red pigment. Disc plane to slightly convex, dark brown to black. Hymenium 70–110 µm tall. Epithymenium brown. Hypothecium to 100 µm high, colourless. Spores *Mischoblastia*-type, smooth or finely rugulate, 18–26 × 10–15 µm, torus poorly developed, ontogeny of type A. Conidia bacilliform 4–5 × 1.0–1.5 µm.

Chemistry: K+ yellow, P+ yellowish (often weak because of the thin thallus). Atranorin.

Habitat. Saxicolous, on moist siliceous rocks in lowland areas.

Distribution. Rare in southern and central Norway, Denmark and southern Finland, scattered in southern and central Sweden. **D:** Fyn Brn. **F:** EH. **N:** Ak Vf ST SNo. **S:** Sk Bl SmI Hl Bh Dls Vg Ög Vrm Vsm Upl. Scattered in central and western, rare in southern Europe, also known from North America, southern Africa, Asia and Australia.

Note. Characterized by the presence of atranorin, the pseudolecanorine apothecia and the *Mischoblastia*-type spores. Sheard (1967) and Mayrhofer & Poelt (1979) placed *Rinodina griseofusca* (here treated as a synonym of *R. deflectens*) in synonymy with *R. oxydata*. The record of *R. trachytica* from Skåne (Santesson 1993) refers to *R. oxydata*.

39. *Rinodina parasitica* H. Mayrhofer & Poelt

Biblioth. Lichenol. 12: 137 (1979). – TYPE: Norway, Finnmark, Varangerfjord, 1969, Henssen 20133b (H holotype).

Syn. *Rinodina milvina* var. *amphibolitica* Räsänen

S: parasitkrimmerlav

Literature: Mayrhofer, *J. Hattori Bot. Lab.* 54: 449–450 (1984); Giralt & Llimona, *Mycotaxon* 62: 205–206 (1997).

Lichenicolous on crustose lichens. THALLUS forming small patches to c. 2 cm diam., granulose-verrucose to areolate. Areolae to 0.5 mm diam., dark reddish brown to dark brown. APOTHECIA abundant, to 0.5 mm diam., lecanorine, scattered to crowded, adnate to sessile. Disc flat, rarely convex, black. Hymenium 70–100 µm tall. Epithymenium reddish brown. Hypothecium to 75 µm high. Spores *Physcia*-type, 14.5–21 × 7.5–11 µm, torus well-developed, ontogeny of type A. CONIDIOMATA not seen.

Chemistry. No secondary substances (by TLC) in Nordic material.

Habitat. Lichenicolous, on saxicolous crustose lichens (mainly *Aspicilia* and *Rhizocarpon*) growing on siliceous rocks in the subalpine to alpine or subarctic to arctic zone.

Distribution. Scattered in Norway, rare in Sweden and Finland, also one record from Greenland. **Gr F:** U PeP. **N:** He Te MR SNo Tr ØFi. **S:** Sk Jmt LyL LL. Also known from Scotland, the Pyrenees, and central Europe, where it is rather common in the central Alps.

Note. Characterized by the lichenicolous thallus, the small apothecia and the *Physcia*-type spores.

40. *Rinodina pityrea* Ropin & H. Mayrhofer

Biblioth. Lichenol. 58: 374 (1995). – TYPE: [Switzerland, Geneva] Genf, Carouge S Genf, 1883 Rome (G holotype).

Syn. *Rinodina leprosa* var. *lecideina* A. Massal., *R. colobina* f. *saxicola* de Lesd.

Literature: Ropin & Mayrhofer, *Biblioth. Lichenol.* 58: 374–377 (1995).

THALLUS thin, verrucose, granulose, leprose to scurfy, often blastidiate, dark grey, greyish blue to blackish. Prothallus indistinct. APOTHECIA rare to scattered, 0.5–0.7 mm diam., lecanorine, broadly attached, margin often crenulate. Disc plane to convex, black. Cortex to 30 µm thick. Hymenium 70–90 µm tall. Epithymenium grey to bluish or greenish grey, K+ violet. Hypothecium to 70 µm high, colourless or yellowish. Spores *Tunicata*-type, warty, 17–22 × 7–9 µm, torus indistinct, ontogeny of type A. Conidia bacilliform, 5–7 × 1–2 µm.

Chemistry. K+, C+ and N+ violet (unidentified pigments). No secondary substances (by TLC) in Nordic material.

Habitat. Corticolous, on the base of rough barked deciduous trees, on concrete and walls, rarely soil.

Distribution. Rare in southern and central Sweden. **S:** Sk Hl Bh Upl. Rare on the British Isles, scattered in central and rare in southern Europe.

Note. Characterized by its leprose to blastidiate, dark thallus, the grey, K⁺ violet epihymenium and the *Tunicata*-type warted spores. *Rinodina colobina* has similar thallus and epihymenium characters but is distinguished by smooth, *Pachysporaria*- to *Mischoblastia*-type spores. Furthermore *R. colobina* does not occur on concrete, walls or soil. Sterile thalli of *R. pityrea* cannot be separated from *R. colobina*.

41. *Rinodina polyspora* Th. Fr.

Nova Acta Regiae Soc. Sci. Upsal. Ser. 3, 3: 226 (1861). – Type: [Switzerland] Zürich, Hepp, Flechten Eur. No. 77 (UPS lectotype, Giralt & Mayrhofer, Herzogia 10: 32, 1994).

F: etelännappijäkälä **S:** mångsporig krimmerlav

Syn. *Buellia polysporella* (Nyl.) Arnold

Literature: Magnusson, Acta Horti Gothob. 17: 280–282 (1947); Giralt & Mayrhofer, Herzogia 10: 32–33 (1994); Giralt, Tønsberg & Holien, Lichenologist 34: 4 (2002).

THALLUS thin, smooth, discontinuous, whitish grey to pale grey, sometimes delimited by a dark prothallus. APOTHECIA scattered, rarely confluent, 0.2–0.5 mm diam., lecanorine, broadly attached. Disc plane to convex, reddish brown. Cortex of the apothecial margin 15–35 µm thick, I–. Hymenium 80–110 µm tall. Epihymenium reddish brown. Hypothecium 50–120 µm high, pale yellow. Asci 16-spored. Spores *Physcia*-type, minutely warted at maturity, 12–16 × 6–7.5 µm, torus well-developed, ontogeny of type A. CONIDIOMATA not seen.

Chemistry. Thallus reactions negative. An unidentified substance (7/7/7) with lilac fluorescence under UV-light at 350 nm before charring was detected by TLC.

Habitat. Corticolous, on smooth bark of deciduous trees.

Distribution. Rare in southern and central Sweden and southern Finland. **F:** U EH PH PS. **S:** Gtl Nrk Srm Upl. Also known from neighbouring parts of Russia, Central Europe and North America.

Note. Characterized by the polyspored asci, the thin, discontinuous and pale thallus, the scattered apothecia and

the *Physcia*-type spores. *Rinodina polysporoides*, another species with polyspored asci, not known from the treated regions, has *Dirinari*-type spores.

Most specimens examined were collected in the second half of 19th century. The only recent collection is from Gotland. This indicates that the species might be sensitive to changes in the environment.

42. *Rinodina pyrina* (Ach.) Arnold

Flora 64: 196 (1881). – *Lichen pyrinus* Ach., Lich. Suec. Prod.: 52 (1799). – TYPE: Without locality (BM-ACH lectotype, Ropin & Mayrhofer, Herzogia 9: 815, 1993).

Syn. *Rinodina maculiformis* (Hepp) Arnold

D: pioner-knaplav **F:** puistonappijäkälä

Redlisted in: **D**

Literature: Magnusson, Acta Horti Gothob. 17: 216–220 (1947); Ropin & Mayrhofer, Herzogia 9: 815–820; Giralt & Mayrhofer, Biblioth. Lichenol. 57: 151–153.

THALLUS thin, discontinuous or effuse, minutely verrucose, rarely rimose-areolate, whitish grey to grey, rarely brownish. APOTHECIA abundant, 0.2–0.5 mm diam., lecanorine, subimmersed to broadly attached, often confluent. Disc plane to convex, dark brown to black. Cortex of apothecia margin indistinct. Hymenium 50–70 µm tall. Epihymenium dark brown. Hypothecium 40–60 µm high, colourless. Spores of *Physconia*-type, often slightly curved, smooth or minutely warted, 11–17 × 5–7 µm, torus absent or poorly developed, ontogeny of type A. Conidia bacilliform, 4–6 × 1–1.5 µm.

Chemistry. No secondary substances (by TLC) in Nordic material.

Habitat. Corticolous, on smooth bark, particularly on twigs of deciduous trees and shrubs, also on Juniperus, Pinus and stumps of various trees, sometimes lignicolous.

Distribution. Scattered in Denmark, rare in Norway, rather frequent in southern and central Sweden and Finland. **D:** Fyn Sjæ Brn. **F:** V U EK St EH ES EP PH PS KP OP SoL. **N:** Ak ST NNö. **S:** Sk BI ÖI Gtl Bh Dls Vg Ög Nrk Srm Vrm Vsm Upl Dlr Hls Mpd Ång Jmt Nb ÅsL LyL. Rare on the British Isles, common in central and southern Europe, also known from Asia, northern Africa, North America and Australasia.

Note. Characterized by its thin or evanescent thallus, the

abundant, small and crowded apothecia, the large algal cells (20–30 µm) and the small *Physconia*-type spores.

43. *Rinodina rinodinoidea* (Anzi) H. Mayrhofer & Scheid.

Nord. J. Bot. 12: 454 (1992). – *Buellia rinodinoidea* Anzi, Atti Soc. Ital. Sci. Nat. 9: 253 (1866). – TYPE: [Italy, Lombardia, Rhaetian Alps] Bezzolungo, Anzi (TO lectotype, Mayrhofer & Moberg, Nordic Lichen Flora 2: 73, 2002).

Syn. *R. melanocarpa* Müll. Arg., *R. serpentina* H. Mayrhofer & Poelt

Literature: Mayrhofer et al., Nord. J. Bot. 12: 454–455 (1992); Giralt & Llimona, Mycotaxon 62: 206–207 (1997).

THALLUS thick, to 0.5 mm, areolate. Areolae contiguous, plane to slightly convex, whitish to grey, smooth. Prothallus absent. APOTHECIA abundant, 0.3–1.0 mm diam., immersed to sessile, pseudolecanorine to lecideine. Disc plane to convex, black. Hymenium 80–110 µm tall. Epithymenium reddish brown. Hypothecium colourless to pale brown, 70–180 µm high, often containing over-mature spores. Spores *Milvina*-type, rugulate, 13–18 × 7–11 µm, torus absent or poorly developed, ontogeny of type A. Conidia bacilliform, 5–6 × 1 µm.

Chemistry. Zeorin.

Habitat. Saxicolous, on hard, siliceous rocks or serpentine.

Distribution. Scattered in Norway and Sweden. **N:** Ho ST ØFi. **S:** ÖI Gtl Vg Ög Hrg Jmt. Also known from the mountains of Central and Southern Europe and the Karakorum.

Note. Characterized by the thick, areolate, pale grey thallus, the pseudolecanorine to lecideine apothecia and the small *Milvina*-type spores.

44. *Rinodina roscida* (Sommerf.) Arnold

Arnold, Verh. Zool.-Bot. Ges. Wien 37: 133 (1887). – *Lecanora roscida* Sommerf., Suppl. Flor. Lappon. 97 (1826). – TYPE: [Norway, Nordland] Saltdalen ad Rognlien, 1824 Sommerfelt (O lectotype, Mayrhofer & Moberg, Nordic Lichen Flora 2: 73, 2002).

Syn. *Rinodina turfacea* var. *microcarpa* (Hepp) Körb., *R. roscida* var. *crassa* H. Magn.

D: dug-knaplav **F:** kalkkinappijäkälä

Literature: Magnusson, Acta Horti Gothob. 17: 257–261 (1947).

THALLUS thin, evanescent or minutely granulate, white to

greyish white, smooth. APOTHECIA abundant, 0.5–1.0 mm, rarely to 3.0 mm diam., lecanorine, substipitate, constricted at base. Disc concave to plane, black with white pruina. Cortex of the apothecial margin distinct, I–. Medulla with oxalate crystals, (insoluble in K, forming needles in sulphur acid). Hymenium 100–150 µm tall. Epithymenium brown. Hypothecium 30–60 µm high, colourless. Spores *Physcia*-type, 24–35 × 8–13 µm, torus well-developed, ontogeny of type A. Conidia bacilliform, 4–5 × 1 µm.

Chemistry. ± Variolaric acid, ± zeorin, ± unknown triterpenoids.

Habitat. Muscicolous or on decaying plants, rarely on naked earth, lignum or antlers. On calcareous ground in arctic-alpine, rarely subalpine regions.

Distribution. Scattered in the arctic-alpine regions of Norway and Sweden, rare in Finland, on the Arctic Islands and Greenland. **Gr F:** PH Ks EnL. **N:** He Op Ho ST NNo Tr VFi ØFi. **AI:** Bi Sb. **S:** Vrm Hrg Jmt LyL TL. Common in the Alps and the Carpathian Mountains, rare in the mountains of southern Europe. Also known from Siberia, the Karakorum Mountains and North America.

Note. Characterized by the inconspicuous whitish thallus, the large, pruinose apothecia and the large, elongate *Physcia*-type spores.

45. *Rinodina septentrionalis* Malme

Svensk. Bot. Tidskr. 6: 920 (1913). – TYPE: Sweden, Jämtland, Undersåker, 1912 Malme, Lich. Suec. Exs. No. 290 (UPS lectotype, Mayrhofer & Moberg, Nordic Lichen Flora 2: 73, 2002).

Syn. *Rinodina dispersella* (Vain.) Vain., *R. hyperborea* H. Magn., *R. phaeostigmella* H. Magn., *R. subfusca* H. Magn.

F: pohjannappijäkälä

Literature: Magnusson, Acta Horti Gothob. 17: 272–275 (1947); Ropin & Mayrhofer, Herzogia 9: 821–823 (1993); Hinteregger, Biblioth. Lichenol. 55: 293–294 (1994); Giralt & Mayrhofer, Biblioth. Lichenol. 57: 153–155 (1995).

THALLUS consisting of scattered convex verrucae, whitish to greenish or red-brown. Prothallus indistinct. APOTHECIA abundant, 0.3–0.5 mm diam., lecanorine, sessile, constricted at the base. Disc plane, dark reddish brown to black. Cortex of the apothecial margin indistinct or to 10–25 µm wide below. Hymenium 60–80 µm tall. Epithymenium red-brown. Hypothecium to 50 µm high. Spores *Physcia*-ty-

pe, smooth or minutely warted, 15–20 × 6–9 µm, torus well-developed, ontogeny of type A. CONIDIOMATA not seen.

Chemistry. No secondary substances (by TLC) in Nordic material.

Habitat. Corticolous, on smooth bark of twigs of mainly deciduous but also coniferous shrubs and trees.

Distribution. Widely distributed in northern Norway, northern Sweden and northern Finland, scattered in central Norway and central and southern Finland. **F:** V St EH ES PH PS KP OP PeP Ks KiL SoL EnL InL. **N:** Ak Op AA Ho MR ST SNo NNo Tr VFi ØFi. **S:** Vrm Dlr Hls Mpd Ång Hrj Jmt Vb Nb ÅsL LyL LL TL. Also known from the mountains of central and southern Europe and Siberia.

Note. Characterized by the small, sessile and basally constricted apothecia, the plane discs, the thin cortex of the apothecial margin and the *Physcia*-type spores.

46. *Rinodina sheardii* Tønsberg

Bryologist 95: 216 (1992). – TYPE: U.S.A. Alaska, Borough of Juneau, NW of Juneau City, bank of Cowee Creek, just N of the road, 1991 Tønsberg 16270 (BG holotype).

Literature: Tønsberg, Bryologist 95: 216–217 (1992); Giralt, Mayrhofer & Sheard, Lichenologist 27: 21 (1995); Sheard, Herzogia 11: 121 (1995); Tønsberg, Graphis Scripta 9: 29 (1998); Elix & Tønsberg, Graphis Scripta 10: 5 (1999); Giralt, Mayrhofer, van den Boom & Elix, Lichenologist 33: 101 (2001).

Figs: Tønsberg 1992: 216.

THALLUS indistinct or thin, continuous to areolate, sorediate. Areolae glaucous, or rarely whitish, with yellowish to pale brown soralia. APOTHECIA sparse to abundant, to 0.5 mm diam., lecanorine, broadly attached. Thalline margin rarely with discrete soralia. Disc plane, dark brown to black. Thalline exciple 60–70 µm. Hymenium to 100 µm tall. Epihymenium red-brown. Hypothecium to 80 µm high, brownish, with oil droplets. Spores *Physcia*-type, smooth, 16–35 × 8–17 µm, torus prominent. CONIDIOMATA not seen.

Chemistry. Soralia K–, C+ orange, KC–, P–. Zeorin, secalononic acid A (major), thiomelin (minor), 5,7-dichloro-8-hydroxy-2-methoxy-1,3-dimethylxanthone (minor), atranorin (trace).

Habitat. Corticolous, on deciduous trees in humid places, such as the spray zone of waterfalls.

Distribution. So far known from a few localities in Norway and Central Sweden. **N:** Ak Op Ro Ho SF NNo. **S:** Dlr. Otherwise known from Austria and northwestern North America.

Note. Characterized by the yellowish soralia, the broadly attached apothecia and the variably sized *Physcia*-type spores.

47. *Rinodina sicula* H. Mayrhofer & Poelt

Biblioth. Lichenol. 12: 143 (1979). – TYPE: Italy, Sicilia, Messina, Monti Nebrodi, M. Trefinaite, Borgo Piedrapizzuta, 1978 Hertel & Hertel 19609 (M holotype).

Syn. *Rinodina orculariopsis* H. Mayrhofer

Literature: Mayrhofer, J. Hattori Bot. Lab. 55: 445–446 (1984); Giralt & Llimona, Mycotaxon 62: 215–217 (1997).

THALLUS thin, rimose-areolate to areolate, grey to black-brown. Prothallus black. APOTHECIA abundant, often crowded and contiguous, 0.3–0.5 mm diam., lecanorine, broadly attached. Disc plane. Proper exciple distinct, black. Hymenium 90–110 µm tall. Epihymenium reddish brown. Hypothecium to 150 µm high, colourless. Spores *Physconia*-type, finely warted, 16–23 × 8–11.5 µm, torus well-developed, ontogeny of type A. CONIDIOMATA not seen.

Chemistry. Margin of the apothecia C+ red (microscope!). Gyrophoric acid (with lecanoric and orsellinic acids) mainly present in the margin of the apothecia, zeorin.

Habitat. Saxicolous, on hard siliceous rocks.

Distribution. Scattered in southern and central Sweden, rare in Denmark. **D:** ØJy Brn. **S:** Sk Bl SmI Bh Vg Nrk Vrm. Also from the British Isles and from few localities in central and southern Europe.

Note. Characterized by its brown thallus, the crowded apothecia, the *Physconia*-type spores, the well-developed torus and the presence of gyrophoric acid in the apothecial margin. Malmé's exsiccate (Lich. Suec. exs. 716) cited under *Rinodina interpolata* by Mayrhofer & Poelt (1979: 110) and Mayrhofer (1984: 426) refers to *R. sicula*. One record of *R. occulta* from Närke (Vättern, Hellbom, UPS) and the record from Skåne (Mayrhofer 1984: 445) also refer to *R. sicula*.

48. *Rinodina sophodes* (Ach.) A. Massal.

Rich. Lich. Crost.: 14 (1852). – *Lichen sophodes* Ach., Lich.

Suec. Prod.: 67 (1798). – TYPE: Locality not indicated (BM-ACH lectotype, Ropin & Mayrhofer, Herzogia 9: 823, 1993).

Syn. *Rinodina sophodes* var. *genuina* Th. Fr., *R. sophodes* var. *orbicularis* (A. Massal.) H. Olivier, *R. sophodes* var. *lusitanica* H. Magn.

D: aske-knaplav **F:** lepännappijäkälä **S:** mörk krimmerlav

Redlisted in: **D**

Literature: Magnusson, Acta Horti Gothob. 17: 220–226 (1947); Ropin & Mayrhofer, Herzogia 9: 823–827 (1993); Giralt & Mayrhofer, Biblioth. Lichenol. 57: 155–157 (1995).

THALLUS in small patches, usually well-developed and cracked-areolate, pale grey to reddish brown. Prothallus black, visible between the areolae and surrounding the thallus. **APOTHECIA** abundant, 0.3–0.8 mm diam., lecanorine, immersed to subimmersed, often confluent. Disc plane, dark brown, rarely black. Cortex 25–50 µm thick, I+ bluish. Hymenium 60–90 µm tall. Epihymenium red-brown. Hypothecium to 50 µm high, colourless. Spores *Milvina*-type, constricted at the septum, smooth or minutely warted, 13–18 × 7–9 µm, torus well-developed, ontogeny of type A. Conidia bacilliform, 3.5–5 × 1–1.5 µm.

Chemistry. No secondary substances (by TLC) in Nordic material.

Habitat. Corticolous, on smooth bark, especially twigs of deciduous trees, always associated with other pioneer species.

Distribution. Scattered in the southern and central parts of Norway, Sweden and Finland; rare in Denmark. **D:** ØJy Brn. **F:** A V U EK St EH ES EP PH PK KP Kn PeP EnL InL. **N:** Ak Op Bu Vf Te AA Ro Ho SF MR ST NT SNo NNo Tr. **S:** Bl Öl Gtl SmI HI Bh Dls Vg Ög Nrk Srm Vrm Vsm Upl Dlr Gst Hls? Nb. Widely distributed in the British Isles, in central and southern Europe and Macaronesia, also known from northern Africa and Asia minor.

Note. Characterized by the well-developed, usually reddish brown, cracked-areolate thallus on a black prothallus, the crowded, immersed to subimmersed apothecia, the thick I+ bluish cortex of the apothecial margin and the small *Milvina*-type spores, constricted at the septum. Records from Finnish Lapland need confirmation.

49. *Rinodina stictica* Sheard & Tønsberg

Bryologist 98: 41 (1995). – TYPE: U.S.A. Washington [Olympic

Peninsula] Jefferson Co., S bank of Boagachel River, 0.4 mile E Dowans Cr., 1993 Tønsberg 19506 (BG holotype).

Literature: Sheard & Tønsberg, Bryologist 98: 41–44 (1995); Sheard, Herzogia 11: 121–122 (1995); Giralt, Barbero & v.d. Boom, Lichenologist 28: 5–6 (1996); Tønsberg, Graphis Scripta 9: 29–30 (1998).

Figs: Sheard & Tønsberg 1995: 42.

THALLUS usually endophloeodal rarely areolate, blastidiate to sorediate. Areolae sparse, present only in fertile thalli, pale grey, convex, sometimes forming soralia. Soralia pale green or greyish to greyish blue, usually discrete, rarely contiguous. Prothallus fimbriate. **APOTHECIA** 0.6–1.1 mm diam., lecanorine, broadly attached. Disc plane, black. Cortex of the apothecial margin 35–60 µm thick, with intricate hyphal structure. Hymenium to 130–140 µm tall. Epihymenium red-brown. Hypothecium 30–50 µm high, colourless. Spores *Callispora*-type (Fig. 2) in immature unpigmented stages, then *Physcia*- to *Pachysporaria*-type, smooth, 20–30 × 11–16 µm, torus distinct. **CONIDIOMATA** not seen.

Chemistry. K+ yellow, C–, KC–, P+ orange-red. Atranorin, chloroatranorin, zeorin, stictic acid with traces of satellites.

Habitat. Corticolous, mainly on twigs but also on trunks of deciduous and coniferous trees in humid situations (at the Norwegian locality on twigs of *Picea* in the spray zone of a waterfall in a ravine).

Distribution. So far known only from one locality in Norway. **N:** Op. Otherwise known from western North America.

Note. Characterized by the pale green or greyish to greyish blue soralia, the variable spores and the presence of stictic acid.

50. *Rinodina teichophila* (Nyl.) Arnold

Flora 46: 329 (1863). – *Lecanora teichophila* Nyl., Flora 46: 78 (1863). – TYPE: [England] Cleveland, Ayton, Mudd, Lich. Brit. Exs. No. 108 (BM lectotype, Mayrhofer & Moberg, Nordic Lichen Flora 2: 73, 2002).

Syn. *Rinodina colletica* (Flörke) Arnold, *R. suberumpens* (Nyl.) H. Olivier, *R. calcarea* var. *obscurata* Arnold

Redlisted in: **D**

Literature: Mayrhofer & Poelt, Biblioth. Lichenol. 12: 148–150 (1979); Mayrhofer, J. Hattori Bot. Lab. 55: 466–467 (1984);

Matzer & Mayrhofer, Acta Bot. Fenn. 150: 117–118 (1994); Giralto & Llimona, Mycotaxon 62: 207–208 (1997).

THALLUS to 1 mm thick, crustose to somewhat squamulose, rimose-areolate or verrucose, grey, ochraceous, brown to dark brown. Areolae often verruculose or granulose. Prothallus absent. APOTHECIA abundant, 0.7–1.2 mm diam., lecanorine, immersed to adnate. Proper margin occasionally developed. Disc plane to convex, dark brown to blackish. Hymenium 90–130 μm tall. Epithymenium reddish brown. Hypothecium to 150 μm high, hyaline or pale yellowish. Number of spores/ascus often less than 8. Spores *Mischoblastia*- to *Pachysporaria*-type, finely rugulate, with median swelling in K, 20–32 \times 11–19 μm , torus absent, ontogeny both of type A and B. Conidia bacilliform, 4–5 \times 1–1.5 μm .

Chemistry. No secondary substances (by TLC) in Nordic material.

Habitat. Saxicolous, mainly on siliceous but also on calciferous rocks, particularly on nutrient-enriched anthro-pogenic substrates, such as stone walls, bricks or grave-stones. Outside the area also recorded from tree trunks (Sheard 1967, Fox & Purvis 1992).

Distribution. Rare in Iceland, Denmark and southernmost Norway, scattered in southern Sweden. **D:** ØJy Fyn. **I:** ISu. **N:** Ak Ho. **S:** Sk Gtl SmI Vg Ög. Widespread in the British Isles, scattered in central and southern Europe, North Africa and Asia minor.

Note. Characterized by the thick and rimose-areolate thallus lacking secondary substances, the large apothecia and the large *Mischoblastia*- to *Pachysporaria*-type spores. One record from Värmland (Mayrhofer 1984: 467) refers to *R. oxydata*. The record of *Rinodina* sp. from Iceland (Mayrhofer & Poelt 1979: 47; Mayrhofer 1984: 363) refers to *R. teichophila*.

51. *Rinodina tephrae* (Tuck.) Herre

Proc. Wash. Acad. Sci 12: 250 (1910). – *Lecanora tephrae* Tuck., Amer. J. Arts Sci., Ser. 2, 25: 425 (1858). – TYPE: U.S.A., Vermont, Brattleborough, 1856 Russell & Frost (FH lectotype, Mayrhofer et al., Nord. J. Bot. 12: 455, 1992).

Syn. *Rinodina arenaria* (Hepp) Th. Fr., *R. badiella* (Nyl.) Th. Fr., *R. glebulosa* (Arnold) Arnold, *R. pannarioides* Körb. ex Stein

Literature: Mayrhofer & Poelt, Biblioth. Lichenol. 12: 59–61 (1979); Mayrhofer, J. Hattori Bot. Lab. 55: 379–380 (1984); Poelt & Mayrhofer, Pl. Syst. Evol. 158: 274–275 (1988); Mayrhofer et al., Nord. J. Bot. 12: 455–457 (1992).

THALLUS thin, consisting of discrete verrucae, or thick and continuous, verrucose to squamulose or partly rimose-areolate, grey to brown. Areolae loosely attached to substrate. APOTHECIA abundant, 0.5–1 mm diam., lecanorine, broadly attached to sessile. Disc plane to convex, dark brown to black. Proper exciple distinct, persistent. Spores *Pachysporaria*- to *Physcia*-type, faintly pitted, 16–24 \times 8–14 μm , torus present, ontogeny of type A. CONIDIOMATA not seen.

Chemistry. Zeorin, 5-*O*-methylhiascic and \pm lecanoric acids.

Habitat. Saxicolous, on siliceous rocks in relatively moist and often shaded situations, such as waterfalls, rapids, gorges and shores of lakes, often associated with tufts of cyanobacteria (*Stigonema*).

Distribution. Scattered in central and northern Norway and Sweden, more widely distributed in central Finland. **F:** EH PH PS PK Kn PeP Ks. **N:** ST Tr ØFi. **S:** Vg Nrk Vrm Upl Hls Ång Hvj Jmt Vb LyL PL LL. Also known from neighbouring parts of Russia, a few localities in central and eastern Europe and in eastern North America.

Note. Characterized by the thin to thick, verrucose to squamulose thallus, the association with cyanobacteria and the *Pachysporaria*- to *Physcia*-type spores.

52. *Rinodina terrestris* Tomin

Prirod. Sel'skoe Chozjajst. Zasukh.-Pustyn. S.S.S.R. 3: 59 (1929). – TYPE: [Russia] Lacus Baskunczak, Keller & Tomin (LE lectotype, Mayrhofer & Moberg, Nordic Lichen Flora 2: 73, 2002)

Syn. *Rinodina mucronatula* H. Magn.

Literature: Magnusson, Acta Horti Gothob. 17: 293–294 (1947); Timpe, Diplomarbeit, Graz 1990: 33–38 (ined.); Ertl, Diplomarbeit, Graz 2000: 129–130 (ined.)

THALLUS thin, inconspicuous, verrucose, pale brown to pale grey-brown. Prothallus absent. APOTHECIA abundant, 0.4–1.0 mm diam., lecanorine, adnate. Disc plane to slightly convex, dark grey-brown, rarely pruinose. Hymenium 80–120 μm tall. Epithymenium brown. Hypothecium to 50 μm high, colourless. Spores *Physcia*-type, apices more or less elongated and colourless, 22–30 \times 8–12 μm , torus indistinct, ontogeny of type A. CONIDIOMATA not seen.

Chemistry. \pm Zeorin.

Habitat. Muscicolous, on decaying plants, earth or sandy soil, rarely on lignum.

Distribution. Scattered in western Greenland, rare in the dry valleys of central Norway. **Gr N:** Op. Rare at dry sites in central Europe, scattered in central Asia, Siberia and North America.

Note. Characterized by the conspicuous, elongated and colourless apices of the spores ('apical protuberances' according to Jacobsen & Kappen 1989: 176).

53. *Rinodina turfacea* (Wahlenb.) Körb

Syst. Lich. Germ.: 123 (1855). – *Lichen turfaceus* Wahlenb., Flora Lapon.: 408 (1812). – TYPE: Norway, Finnmark, Hammerfest, 6.VI 1802 Wahlenberg (UPS lectotype, Mayrhofer & Moberg, Nordic Lichen Flora 2: 73, 2002).

Syn. *Rinodina turfacea* var. *normalis* (Th. Fr.) H. Magn., *R. turfacea* var. *depauperata* Th. Fr., *R. turfacea* var. *fuscogrisea* (Vain.) H. Magn., *R. orbata* (Ach.) Vain.

D: hede-knaplav **F:** turvenappijäkälä

Literature: Magnusson, Acta Horti Gothob. 17: 261–266 (1947); Mayrhofer, J. Hattori Bot. Lab. 55: 471–472 (1984); Timpe, Diplomarbeit, Graz 1991: 54–69 (ined.); Giralt, Mayrhofer, van den Boom & Elix, Lichenologist 33: 101 (2001).

THALLUS thin or thick, rugose to verrucose, pale brown to grey-brown, smooth. APOTHECIA abundant or crowded, 0.5–1.7 mm diam., lecanorine, sessile with narrow base, margin prominent. Disc concave to plane, blackish. Cortex of the apothecial margin well-developed, 40–70 µm broad, hyaline, consisting of perpendicular, intricate hyphae, I+ lilac to pale blue. Medulla with crystals (sphaerophorin). Hymenium 130–170 µm tall. Epihymenium brown. Hypothecium 20–50 µm high, colourless. Spores *Physcia*-type, 20–34 × 9–14 µm, torus well-developed, ontogeny of type A. CONIDIOMATA not seen.

Note. Characterized by the large apothecia, the distinct I+ bluish cortex of the apothecial margin and the large *Physcia*-type spores. The records from Finland, Varsinais-Suomi need confirmation.

Key to the varieties

- 1 Thallus muscicolous or on decaying plants, rarely saxicolous var. *turfacea*
- Thallus lignicolous or corticolous 2
- 2 Thallus thin, verrucose to areolate, whitish grey, corticolous var. *cinereovirens*
- Thallus inconspicuous or evanescent, pale brown, lignicolous or very rarely corticolous var. *ecrustacea*

53a. var. *turfacea*

For difference from the other varieties, see below

Chemistry. Sphaerophorin, ± variolaric acid. All spot-tests negative.

Habitat. Muscicolous, on decaying plants and rarely on foliose lichens at arctic-alpine sites.

Distribution. Common in Greenland, rare in Iceland, common on the Arctic Islands, scattered in arctic-alpine regions of Norway, Sweden and Finland. **Gr F:** V PH PS Ks KiL EnL. **I:** IVe IMi IAU INv INo. **N:** He Op Ho MR ST SNo NNo Tr VFi ØFi. **AI:** JM Bi Sb. **S:** Vrm Mpd Ång Hrj Jmt Vb ÅsL LyL PL LL TL. Rare in the alpine belt of the Alps and the Carpathian Mountains, in the Rocky Mountains of North America, in arctic Canada and Siberia. Records from Antarctica refer to another taxon.

53b. var. *cinereovirens* (Vain.) H. Mayrhofer

Mayrhofer in Mayrhofer & Moberg, Nordic Lichen Flora 2: XX (2001). – *Lecanora sophodes* var. *cinereovirens* Vain., Meddel. Soc. Fauna Fl. Fenn. 2: 56 (1878). – TYPE: Finland, Tavastia australis, Asikkala, Kailanniemi, prope Tuomisjoja, ad corticem vetustum Betulae, 1863 J.P. Norrlin (det. E. Vainio), Nyl. & Norrl., Herb. Lich Fenn. No 560 (UPS neotype, Mayrhofer & Moberg, Nordic Lichen Flora 2: 73, 2002).

Syn. *Rinodina cinereovirens* (Vain.) Vain., *R. sophodes* var. *cinereovirens* (Vain.) Zahlbr.

Literature: Magnusson, Acta Horti Gothob. 17: 266–268 (1947); Giralt, Mayrhofer, van den Boom & Elix, Lichenologist 33: 101 (2001).

THALLUS thin, verrucose to areolate, greenish or whitish grey. APOTHECIA abundant, 0.5–1 mm diam., lecanorine, broadly attached to constricted at base. Margin sometimes crenulate. Disc ± plane, brownish black. Spores 22–28 × 11–14 µm.

Chemistry. Sphaerophorin.

Habitat. Corticolous, on bark of old deciduous trees (often *Salix caprea* or *Sorbus aucuparia*) and on *Juniperus*.

Distribution. Rare in northern Norway, scattered in northern and central Sweden and in Finland. **F:** V EH PH PS PK Kn PeP Ks KiL InL. **N:** He Op ST NT Tr VFi ØFi. **S:** Vrm Dlr Mpd Ång Hrj Jmt Vb Nb ÅsL LyL LL TL. Also known from neighbouring parts of Russia.

Note. Characterized by the continuous thin and whitish grey thallus and the corticolous *Habitat*.

53c. var. ecrustacea (Vain.) H. Olivier

Mém. Soc. Sci. Nat. Cherbourg 37: 163 (1909). – *Lecanora turfacea* var. *archaea* f. *ecrustacea* Vain., Meddeland. Soc. Fauna Fl. Fenn. 6: 153 (1881). – TYPE: [Russia, Karelia] Ad corticem salicis in regione abietina montis Päänuorunen, 1878, E.A. Vainio (TUR-V 8803 holotype).

Syn. *Rinodina turfacea* var. *roscida* f. *succedens* (Nyl.) Blomb. & Forsell

Literature: Magnusson, Acta Horti Gothob. 17: 262–266 (1947); Timpe, Diplomarbeit, Graz 1991: 70–73 (ined.); Giralt, Mayrhofer, van den Boom & Elix, Lichenologist 33: 101 (2001).

THALLUS inconspicuous or evanescent. APOTHECIA abundant, mostly scattered, 0.3–1.0 mm diam., lecanorine. Spores *Physcia*-type, 20–29 × 9–13 µm, torus well-developed, ontogeny of type A.

Chemistry. Sphaerophorin, ± variolaric acid.

Habitat. Lignicolous and corticolous, on decaying bark of old *Salix caprea*, more rarely *Pinus*, *Juniperus* and *Sorbus aucuparia*.

Distribution. Rare in arctic and boreal Norway, Sweden and Finland. Records from Greenland need confirmation. **Gr? F:** PeP EnL InL. **N:** ST Tr VFi. **S:** Hls Mpd Ång Hrj Jmt Vb ÅsL PL LL TL. Also known from neighbouring parts of Russia and from Siberia.

Note. Characterized by the relatively small spores, the evanescent thallus, the small and scattered apothecia and the lignicolous *Habitat*.

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APPENDIX

Nomenclatural novelties

Anaptychia

R. Moberg

Anaptychia runcinata (With.) J.R. Laundon
Lichenologist 16: 225 (1984). – *Lichen runcinatus* With.,
Bot. Arr. Veg. Great Britain 2: 712 (1776). – TYPE: Icon in
Dillenius, Historia Muscorum: 133, tab. 18, Fig. 14 (1742)
(holotype); without locality, corresponding specimen in
herb. Dillenius (OXF epitype, here designated).

Buellia

T. Foucard, R. Moberg & A. Nordin

Buellia aethalea (Ach.) Th.Fr.
Lichenogr. Scand. 2: 604 (1874). – *Gyalecta aethalea* Ach.,
Lichenogr. Univ.: 669 (1810). – TYPE: England, "Anglia,
Durham" (H-ACH 66 lectotype, here designated).

Buellia arnoldii Servít
in Servít & Nádvorník, Věstniku Král. ces. Spol. Nauk
2: 39 (1931). – TYPE: Germany, "Bayern, Schachen bei
Garmisch, an Zirben-Ästen", VIII.1874 F. Arnold (M
lectotype, here designated).

Buellia asterella Poelt & Sulzer
Nova Hedwigia 25: 182 (1974). – TYPE: Germany, "Auf
steinigem Boden der kahlen Berghöhen oberhalb Würgau
bei Schesslitz in Oberfranken", 1860 Arnold, Lich. exs.
no. 165, (M lectotype, here designated, as "holotype" in
Poelt & Sulzer, Nova Hedwigia 25: 182, 1974; B BM UPS
WU isolectotypes). – Since the type is an exsiccatae it is
necessary to select a lectotype.

Buellia badia (Fr.) A. Massal.
Memor. Lichenogr. 1853: 124 (1853). – *Lecidea badia* Fr.,
Syst. Orbis Veget. 1: 287 (1825). – TYPE: Sax. arenar. Ger-
maniae (not localized); Austria, Kärnten, "am Südab-hang
des Falkenbergs bei Klagenfurt", 1890 J. Steiner, Arnold,
Lich. Exs. No 1505 (UPS neotype, here designated; S
isoneotype).

Buellia chionea (Th.Fr.) Sheard **comb. nov.**
Basionym: *Rinodina chionea* Th.Fr., Lich. Scand. 1: 206
(1871). TYPE: Norway, Dovre, Vaarstien, 1863, Th. Fries
s.n. (UPS lectotype, here designated).

Buellia chloroleuca Körb.
Parerga Lichenologica: 191 (1860). – TYPE: [Czech Re-
public/Poland] Sudeten, Körber (UPS lectotype, here
designated; L, M isolectotypes).

Buellia concinna Th.Fr.
Nova Acta Reg. Soc. Scient. Upsal., ser. 3, 3: 232 (1860,
sep. print). – TYPE: Norway, Finnmark, Varanger, Nesseby,
1857 Th. M. Fries (UPS lectotype, here designated, as
"holotype" in Scheidegger Nova Hedwigia, 47: 452, 1988;
BM GZU M O P C isolectotypes). – As Fries cites more than
one specimen a lectotype has to be selected. The material
in UPS is not automatically a holotype even though Fries
had his main activity in Uppsala.

Buellia ectolechioides (Vain.) Erichsen
Verhandl. Bot. Ver. Prov. Brandenburg 72: 45 (1930). –
Melanaspicilia ectolechioides Vain., Arkiv Bot. 8(4): 77
(1909). – TYPE: Russia, Siberia, "ad lapidem graniticum in
regione meridiem versus a pago Pitlekai sita", E. Almquist
(TUR-V 9118 lectotype, here designated, as "holotype" in
Scheidegger, Lichenologist 25: 348, 1993; S isolectotype).
– Almquist's original material is in S and additional mater-
ial annotated by Vainio has been discovered in Stockholm.

Buellia gotlandica J. Steiner
Österr. Bot. Zeitschr. 5–7 (1919). – TYPE: original material
in B probably destroyed during World War II. – *Lecidea*
insignis [Sweden] Gotland, bei Wahls?, VIII.1869 Laurer
(B neotype, here designated) = *Buellia disciformis* with a
thick thallus.

Lecidea insignis (Nägeli ex Hepp) Körb.
Flechten Europas, Tab. 6, n. 39(a) (1853). TYPE: Switzer-
land, Graubünden. An der Rinde alter Lerchen und Arven
bei St. Moritz, Hepp, Flechten Europas Exs. No 39(a) (UPS
lectotype, here designated).

Buellia papillata (Sommerf.) Tuck.
Lecidea papillata Sommerf., Suppl. Fl. Lapp.: 154 (1826).

– TYPE: Norway, Nordland, Saltdalen, Sommerfelt (O lectotype, here designated; UPS isolectotype).

Buellia pulverulenta (Anzi) Jatta

Syll. Lich. ital.: 400 (1900). – *Abrothallus pulverulentus* Anzi. – TYPE: Italy, Valviola presso Premadio, Anzi (L lectotype, here designated (as "holotype", Hafellner, Nova Hedwigia Beih. 62: 64, 1979); M isolectotype. – Since two specimens are mentioned in the protologue a lectotype must be selected.

Buellia schaeereri De Not.

Giorn. Bot. Ital. 2: 199 (1846). – TYPE: Switzerland, Schaeerer, Lich. Helv. Exs. No 200 (E lectotype, here designated). – The selected specimen correspond to the description and is preferred since Lich. Helv. Exs. No 200 in other herbaria has proved to contain mixed material. De Notaris own herbarium material has not been available for study.

Buellia stellulata (Taylor) Mudd

Lecidea stellulata Taylor in Mackay, Flora Hibernica 2: 118 (1836). – TYPE: Craig mountain, Taylor (BM lectotype, here designated). – In the publication Taylor cites more than one specimen which means that a lectotype must be selected. We have chosen the material from Kerry mountains which probably is the same material that Scheidegger (1993: 357) regarded as the holotype.

Buellia stigmathea Körb.

Syst. Lich. Germ.: 226 (1855). – TYPE: Without locality, Flotow, Lich. exs. no. 190 (UPS lectotype, here designated).

Buellia tesserata Körb.

Parerga Lich.: 189 (1860). – TYPE: Norway, "An Schieferfelsen Norwegens von Hübner und Kurr gesammelt" (L lectotype, here designated, as "holotype" by Scheidegger, Lichenologist 25: 359, 1993; UPS isolectotype). – Since more than one specimen is mentioned in the protologue a lectotype must be selected.

Diploicia

R. Moberg

Diploicia canescens (Dicks.) A.Massal.

Rcherche sull'autonomia dei licheni crostosi (Ric. Auton. Lich. Crost.): 86 (1852). – *Lichen canescens* Dicks., Fasc. Pl. Crypt. Brit. 1: 10 (1785). – TYPE: [British Isles] In muris et truncis arborum passim, Fasc. Pl. Crypt. Brit. t. 2 f. 5

(lectotype, here designated); Dickson, Hort. Sicc. Brit. Fasc. 13, No. 24 (BM epitype, here designated).

Heterodermia

R. Moberg

Heterodermia speciosa (Wulf.) Trevis.

Atti Soc. Ital. Sci. Nat. 11: 614 (1868). – *Lichen speciosus* Wulf. in Jacquin, Collectanea 3: 119 (1791 "1789"). – *Anaptychia speciosa* (Wulf.) A. Massal., Mem. Lich.: 36 (1853). – TYPE: [Austria] Montis Calvariae saxis, Wulfen, Collectanea 3 t. 7 (lectotype, here designated); Switzerland, Tessin, 5 km S of Bellinzona, 1934 Degelius (UPS epitype, here designated).

Phaeophyscia

R. Moberg

Phaeophyscia kairamoi (Vain.) Moberg

Symb. Bot. Ups. 22(1): 40 (1977). – *Physcia kairamoi* Vain., Meddeland. Soc. Fauna Fl. Fenn. 46: 3 (1921). – TYPE: Russia, Lapponia ponojensis, Orlow. 1889 Kihlman 298 (H lectotype, here designated, as 'holotype' in Moberg, Svensk Bot. Tidskr. 63: 343, 1969). – Since additional material was discovered in S, a lectotype must be selected.

Physcia

R. Moberg

Physcia dimidiata (Arnold) Nyl.

Flora 64: 537 (1881). – *Parmelia pulverulenta* var. *dimidiata* Arnold, Flora 47: 594 (1864). – TYPE: [Germany, Bayern] Eichstätt, Arnold, Lich. Exs. no. 272 (M lectotype, here designated, as "holotype" by Moberg, Svensk Bot. Tidskr. 65: 134, 1971). – Since the type is an exsiccatae a lectotype must be selected.

Physconia

R. Moberg

Physconia distorta (With.) J.R. Laundon

Lichenologist 16: 218 (1984). – *Lichen distortus* With., Bot. Arr. Veg. Gr. Brit. 1: 711 (1776). – TYPE: Icon in Dillenius, Hist. Musc.: t. 24, 72A (1742) (lectotype, Laundon, Lichenologist 16: 218, 1984); without locality, corresponding specimen in herb. Dillenius (OXF epitype, here designated).

Rinodina

H. Mayrhofer & R. Moberg

Rinodina balanina (Wahlenb.) Vain.

Ark. Bot. 8(4): 69 (1909). – *Lichen balaninus* Wahlenb., Flora Lappon.: 426 (1812). – TYPE: [Norway, Finnmark] In petris insula sinus altensis 13.V.1802 Wahlenberg (UPS lectotype, here designated).

Rinodina bischoffii (Hepp) A.Massal.

Framm. Lichenogr.: 26 (1855). – *Psora bischoffii* Hepp, Flechten Europas 81 (1853). – TYPE: Hepp, Flechten Europas No 81 (G lectotype, here designated).

Rinodina confragosa (Ach.) Körb.

Syst. Lich. Germ.: 125 (1855). – *Parmelia confragosa* Ach., Methodus: 33 (1803). – TYPE: [Sweden] Suecia (H-ACH 1030A lectotype, here designated).

Rinodina conradii Körb.

Syst. Lich. Germ.: 123 (1855). – TYPE: [Poland] Conradsthal bei Salzbrunn, G.W. Körber (L lectotype; Mayrhofer & Moberg, here designated).

Rinodina convexula H. Magn.

Acta Horti Gothob. 17: 290 (1947). – TYPE: Finland, Ostrobotnia borealis, Simo, Simonkylä, Pahnilankangas. Ad corticem Sorbi aucupariae in horto, 11.VII.1936, Räsänen, Lich. Fenn. Exs. No 609 (UPS lectotype, here designated).

Rinodina dubyana (Hepp) J. Steiner

Verh. Zool.-Bot. Ges. Wien 69: 60 (1919). – *Lecidea dubyana* Hepp, Flechten Europas 322 (1857). – TYPE: Hepp, Flechten Europas No 322 (G lectotype, here designated).

Rinodina gennarii Bagl.

Comment. Soc. Critt. Ital. 1: 17 (1861). – Type: Italy, Liguria, Mte. Faiallo nell' Apennino di Voltri, Baglietto (MOD lectotype, here designated).

Rinodina immersa (Körb.) Zahlbr.

Sitzber. Kais. Akad. Wiss. Wien, Math.-Naturw. Cl. 115: 522 (1906). – *Rinodina bischoffii* var. *immersa* Körb., Parerg. Lichenol.: 75 (1859). – TYPE: [Germany, Bavaria] Ad lapides calcareos (Solnhofener Formation) montium sterilius prope Eichstätt, F. Arnold, Körber, Lich. sel. Germ. exs. 127 (ZT lectotype, here designated).

Rinodina isidioides (Borrer) H. Olivier

Mem. Soc. Sci. Nat. Cherbourg 37: 186 (1909). – *Parmelia isidioides* Borrer ex Hook. & Sowerby, Suppl. Engl. Botany 3: tab. 2808 (1843). – TYPE: Wales, Cwm Bychan, Salwey, 1835 (BM lectotype, here designated).

Rinodina laevigata (Ach.) Malme

Bih. Kongl. Svenska Vet.-Akad. Handl. 21(III/11): 25 (1895). – *Lecanora sophodes* var. *L. laevigata* Ach., Lich. Univ. 357 (1810). – TYPE: Without locality (H-ACH 1178A lectotype, here designated). – Acharius 1178 consists of three specimens, the specimen from Lusatia (B) refers to *R. orculata*, the specimen from Silesia (C) probably to *R. albana*, the remaining small sample, which is typical for the taxon as previously understood, is designated as lectotype.

Rinodina luridescens (Anzi) Arnold

Flora 55: 39 (1872). – *Buellia luridescens* Anzi, Comment. Soc. Critt. Ital. 1(3): 158 (1862). – Type: Italy, Toscana: ad rupes et saxa granitica in Castanearum sylvis di Monti Pisano, Anzi, Lich. Rar. Etr. Exs. No 20 (UPS lectotype, here designated; BM M ZT isolectotypes).

Rinodina malangica (Norman) Arnold

Flora 64: 196 (1881). – *Rinodina leprosa* * *malangica* Norman, Kongel. Norske Vidensk. Selsk. Skr. 5: 342 (1868). – TYPE: [Norway, Troms] Moen convallis Målselven, J.M. Norman (O lectotype, here designated).

Rinodina mniaraea (Ach.) Körb.

Syst. Lich. Germ.: 126 (1855). – *Lecanora 'mniaroea'* Ach., Syn. Lich. 339 (1814). – TYPE: Switzerland, 'Helvetia', J.C. Schleicher (H-ACH 1136 '91a' lectotype, here designated).

Rinodina mniaraea var. **cinnamomea** Th. Fr.

Nova Acta Regiae Soc. Sci. Upsal. 3(3): 228 (1860). – TYPE: Norway: Finnmark: Syd-Varanger, Ö Pasvig [Pasvik], 22.8.1857, Th. Fries (UPS lectotype, here designated).

Rinodina mniaraea var. **mniaraeiza** (Nyl.) H. Magn.

Acta Horti Gothob. 17: 256 (1947). – *Lecanora 'mniaroeiza'* Nyl., Flora 53: 33 (1870). – Type: Finland: Tavastia borealis: Häme, Padasjoki, 1866, J.P. Norrlin (H-NYL 28734 lectotype, here designated).

Rinodina occulta (Körb.) Sheard

Lichenologist 3: 349 (1967). – *Buellia occulta* Körb.,

Excluded species

Parerg. Lich.: 186 (1860). – Type: Poland, Wolfsschlucht, Kynast, Körber, Lich. Sel. Germ. Exs. No 34 (M lectotype, here designated).

Rinodina rinodinoides (Anzi) H. Mayrhofer & Scheid. Nord. J. Bot. 12: 454 (1992). – *Buellia rinodinoides* Anzi, Atti Soc. Ital. Sci. Nat. 9: 253 (1866). – TYPE: Italy, Lombardia: Rhätische Alpen, Bezzolungo, Anzi (TO lectotype, here designated; UPS isolectotype).

Rinodina roscida (Sommerf.) Arnold Arnold, Verh. Zool.-Bot. Ges. Wien 37: 133 (1887). – *Lecanora roscida* Sommerf., Suppl. Flor. Lapon. 97 (1826). – TYPE: Norway, Nordland, Saltdalen ad Rognlien, 1824 Sommerfelt (O lectotype, here designated).

Rinodina septentrionalis Malme Svensk. Bot. Tidskr. 6: 920 (1913). – TYPE: Sweden, Jämtland, Undersåker, 1912 Malme, Lich. Suec. Exs. No 290 (UPS lectotype, here designated; W isolectotype).

Rinodina teichophila (Nyl.) Arnold Flora 46: 329 (1863). – *Lecanora teichophila* Nyl., Flora 46: 78 (1863). – TYPE: England: Ayton, Cleveland, Mudd, Lich. Brit. Exs. No 108 (BM lectotype, here designated; UPS isolectotype).

Rinodina terrestris Tomin Prirod. Sel'skoe Chozjajst. Zasukh.-Pustyn. S.S.S.R. 3: 59 (1929). – TYPE: [Russia] Lacus Baskunczak, Keller & Tomin (LE lectotype, here designated).

Rinodina turfacea (Wahlenb.) Körber Syst. Lich. Germ.: 123 (1855). – *Lichen turfaceus* Wahlenb., Flora Lapon.: 408 (1812). – TYPE: Norway, Finnmark: Kvaløja, Hammerfest, 6.6.1802, G. Wahlenberg (UPS lectotype, here designated).

Rinodina turfacea var. cinerovirens (Vain.) H. Mayrhofer **comb. nov.**
Basionym: *Lecanora sophodes* var. *cinereovirens* Vain., Meddelanden Soc. Fauna Fl. Fenn. 2: 56 (1878). – TYPE: Finland, Tavastia australis, Asikkala, Kailanniemi, prope Tuomisöja, ad corticem vetustum Betulae, 16.VI.1863 J.P. Norrlin (det. E. Vainio) (not localized); Nyl. & Norrl., Herb. Lich. Fenn. No 560 (UPS neotype, here designated).

Buellia obtecta Nilson

Naturw. Unters. Sarekgebirg. 3, 1: 46 (1907). – TYPE: Sweden, Lule Lappmark, Untere Region, am Särkojokk, Nilson-Kajanus (no material located). – Type has not been found. According to the description it could be an abnormal morph of *Buellia disciformis* with a reddish black epihymenium.

Buellia saxorum from Sweden, Värmland is *Buellia leptocline*.

Buellia thioconis Norman

Norske Vid.-Selsk. Skr. 5: 358 (1868). – TYPE: Norway, Troms, ”in insula Tromsö ad terram muscis & lichenibus destructis vestitam”, Norman (O holotype). = *Dactylospora parasitica* (Flörke) Zopf

Buellia triphragmia on bark = *Buellia disciformis*.

Rinodina arnoldii H. Mayrhofer & Poelt. Nordic material refers to *Rinodina milvina*.

Rinodina castanomela (Nyl.) Arnold. The material from Sweden (Jämtland) refers to *Rinodina endophragmia*.

Rinodina castanomelodes H. Mayrhofer & Poelt. The material from Lycksele Lappmark refers to *Rinodina bischoffii*, the specimen from Torne Lappmark to *Rinodina calcigena*.

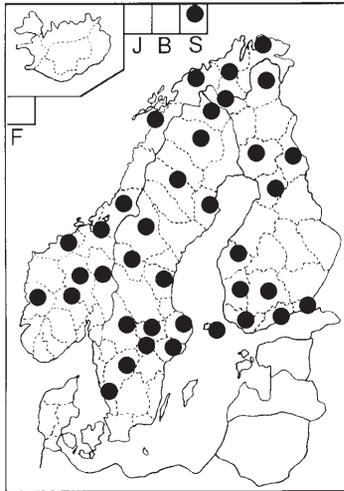
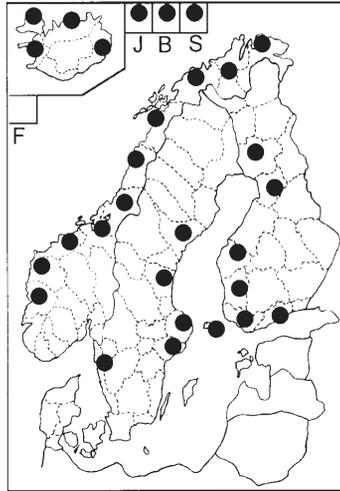
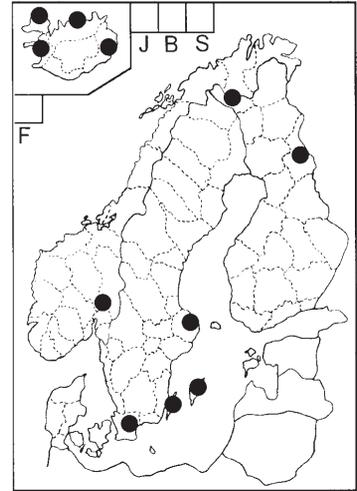
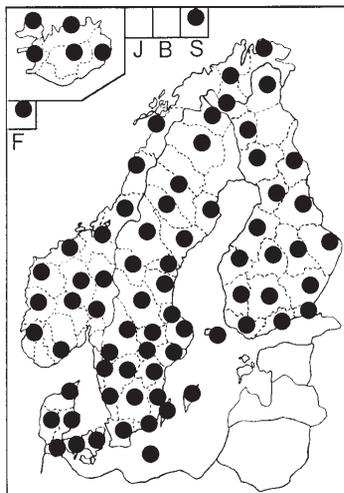
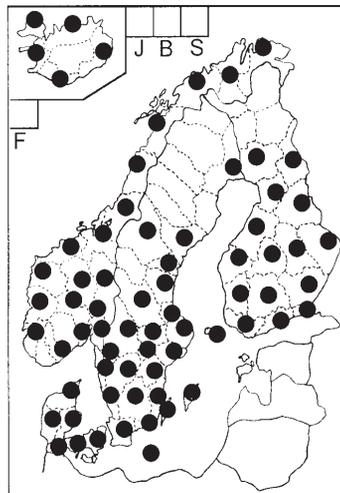
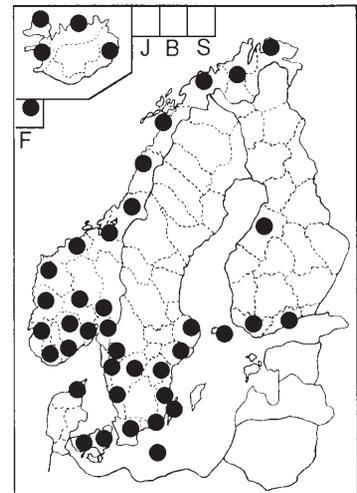
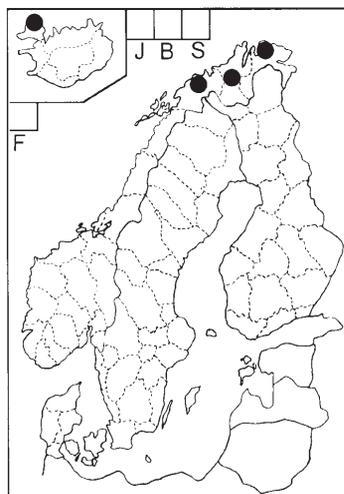
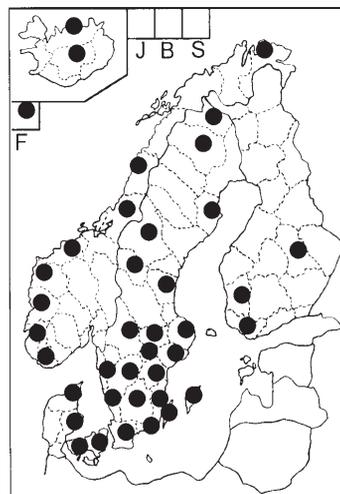
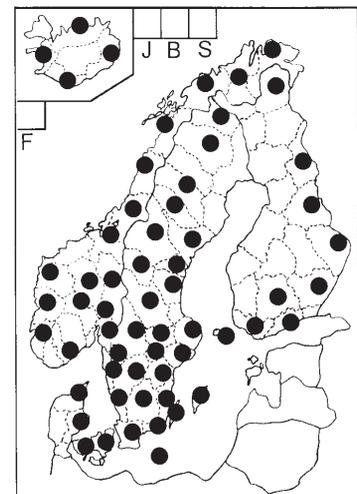
Rinodina consocians H. Magn. The material from northern Finland (Enontekiön Lappi) refers to *Rinodina metaboliza*.

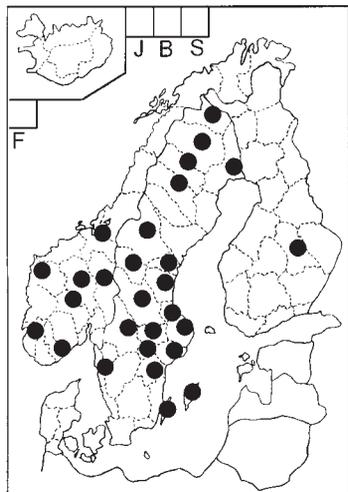
Rinodina granulans H. Magn. The material from Sweden (Medelpad) refers to *Rinodina metaboliza*.

Rinodina laxa H. Magn. The material from Norway (Oppland) refers to *Rinodina archaea*.

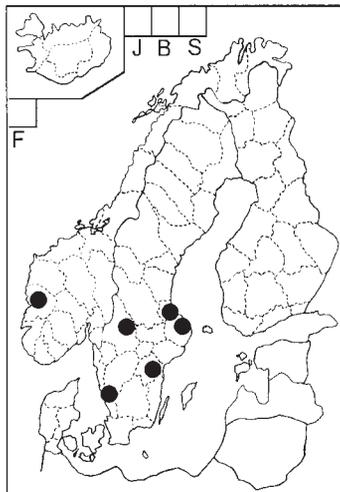
Rinodina lignaria H. Magn. The material from Sweden (Lycksele Lappmark) refers to *Rinodina archaea*; the specimen from Norway (Akershus) is uncertain.

Rinodina trachytica (A. Massal.) Bagl. & Carestia. The material from Sweden (Skåne) refers to *Rinodina oxydata*

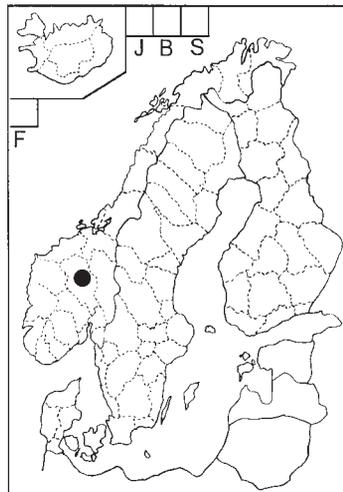
1 *Amandinea cacuminum*2 *Amandinea coniops*3 *Amandinea lecideina*4 *Amandinea punctata*5 *Anaptychia ciliaris*6 *Anaptychia runcinata*7 *Buellia adjuncta*8 *Buellia aethalea*9 *Buellia alboatra*



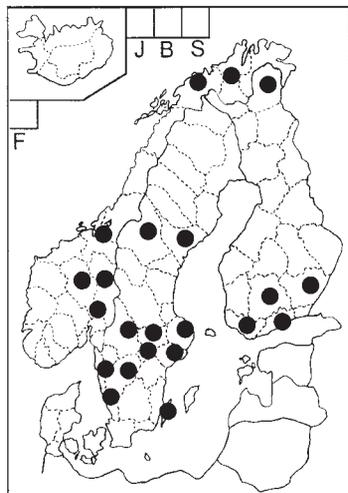
10 *Buellia arborea*



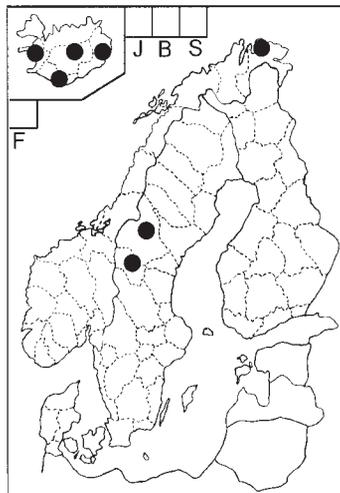
11 *Buellia arnoldii*



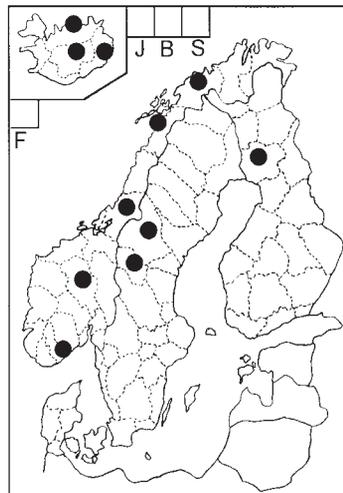
12 *Buellia asterella*



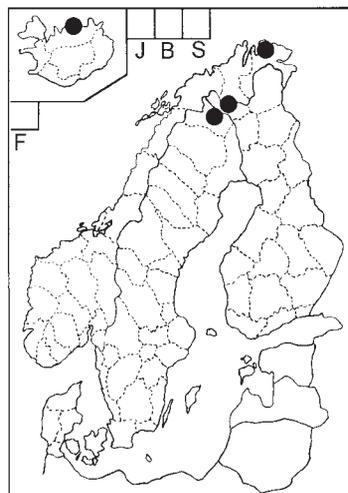
13 *Buellia badia*



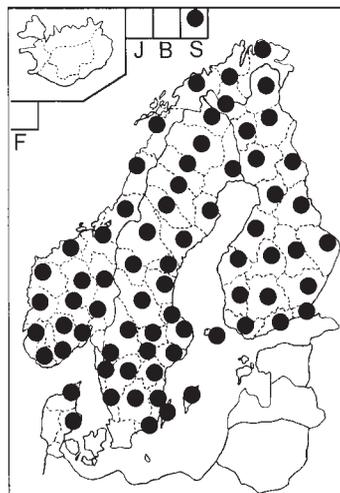
14 *Buellia chionea*



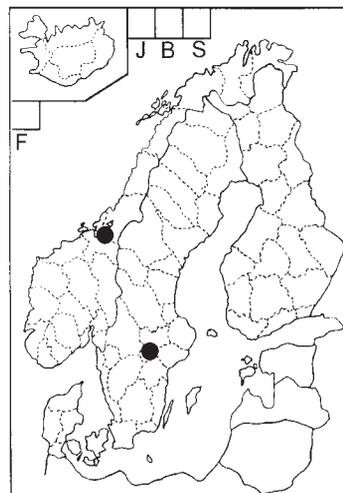
15 *Buellia chloroleuca*



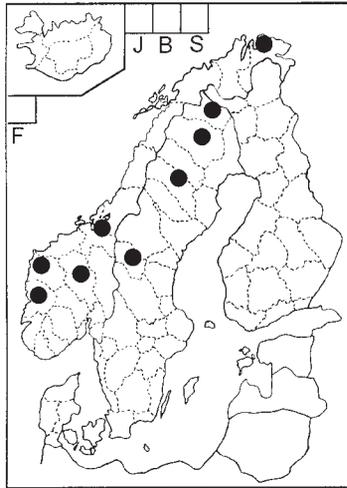
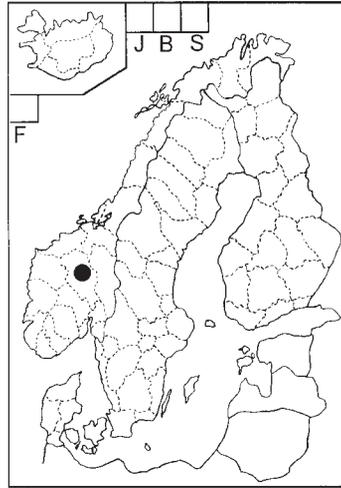
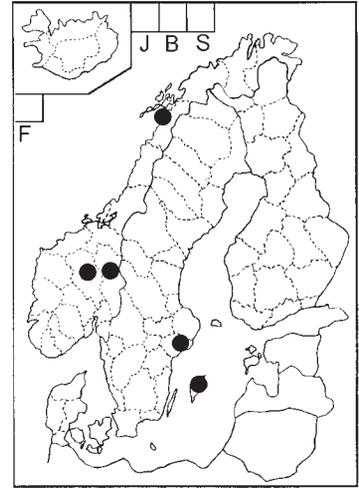
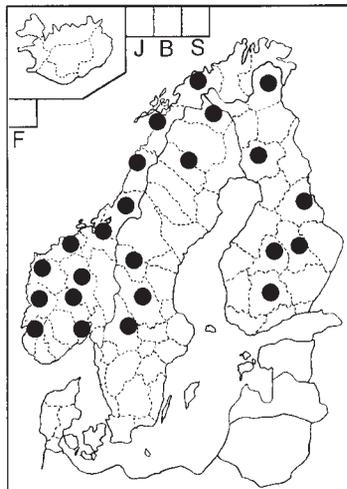
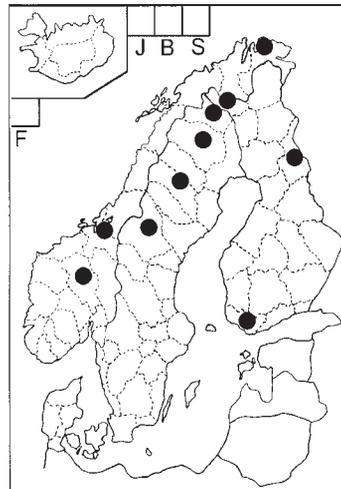
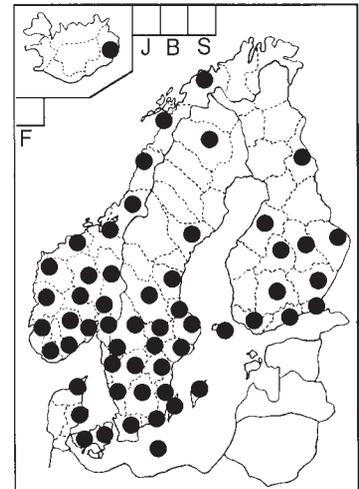
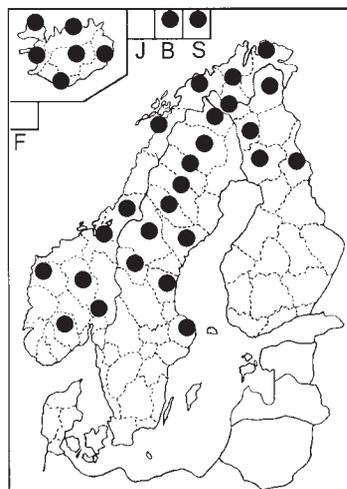
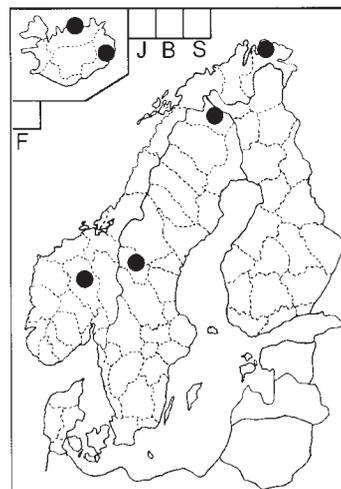
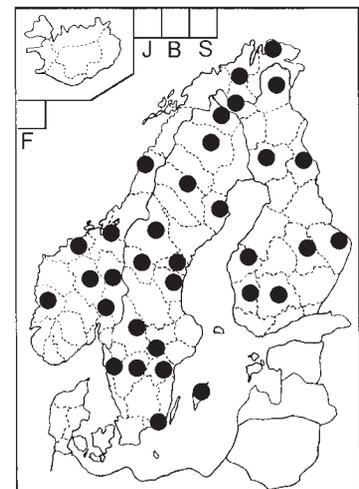
16 *Buellia concinna*

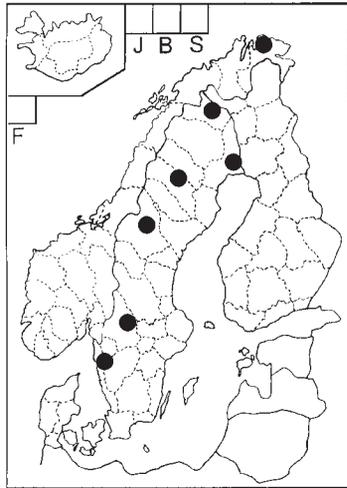


17 *Buellia disciformis*

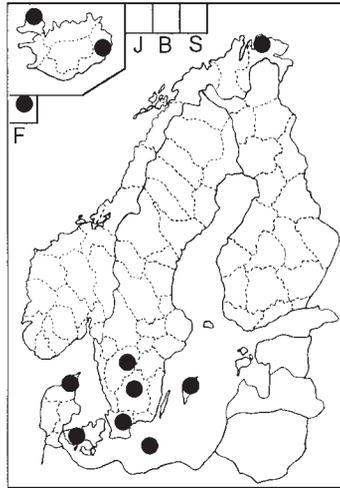


18 *Buellia dives*

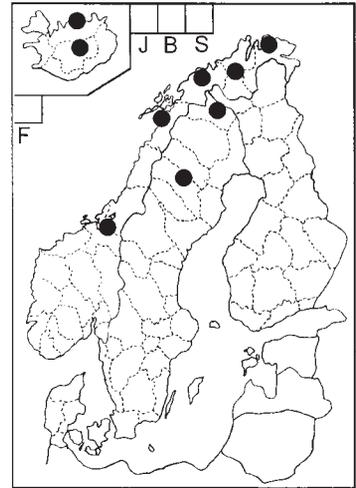
19 *Buellia ectolechioides*20 *Buellia elegans*21 *Buellia epigaea*22 *Buellia erubescens*23 *Buellia geophila*24 *Buellia griseovirens*25 *Buellia insignis*26 *Buellia jugorum*27 *Buellia leptoclina*



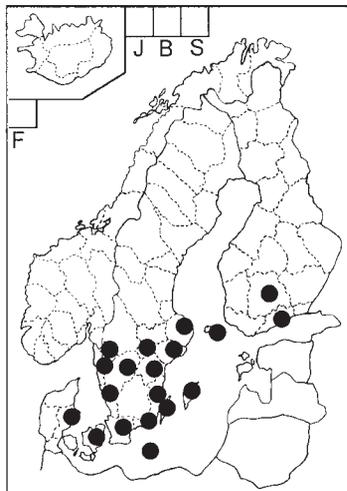
28 *Buellia miriquidica*



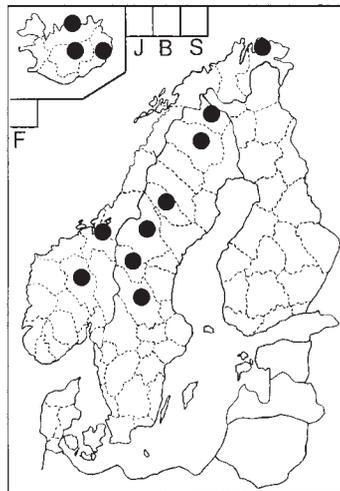
29 *Buellia ocellata*



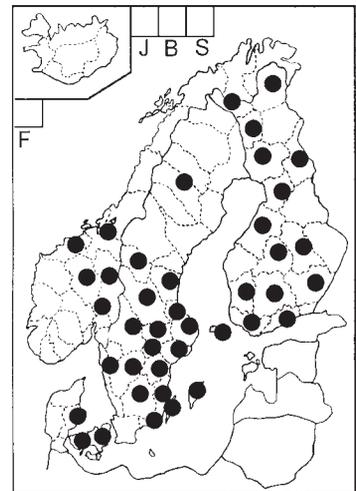
30 *Buellia papillata*



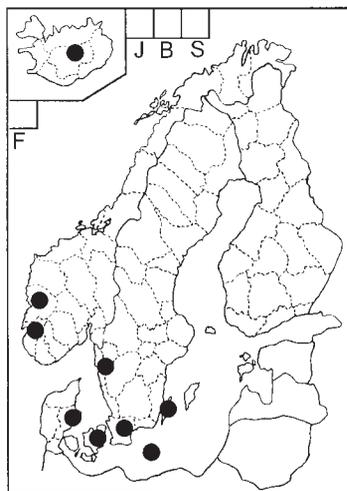
31 *Buellia pharcidia*



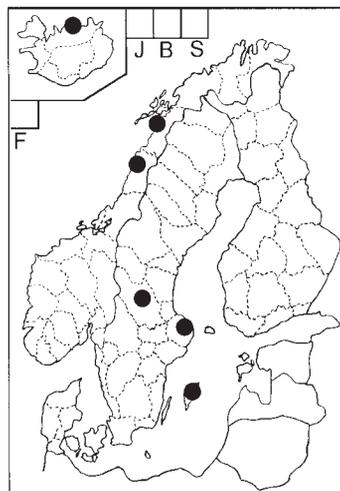
32 *Buellia pulverulenta*



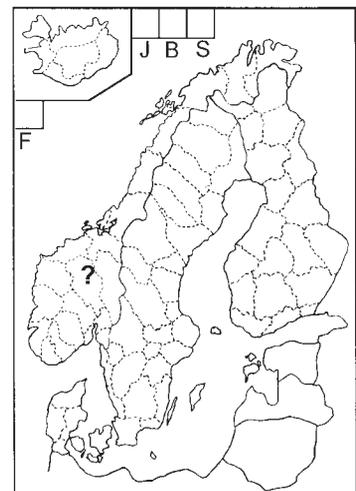
33 *Buellia schaeereri*



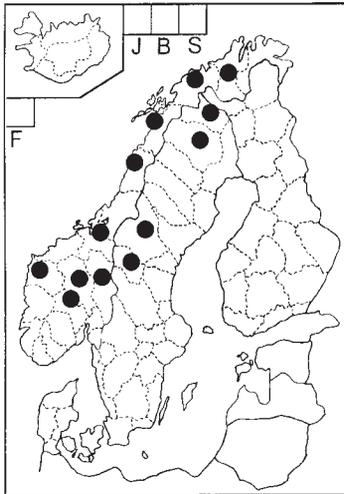
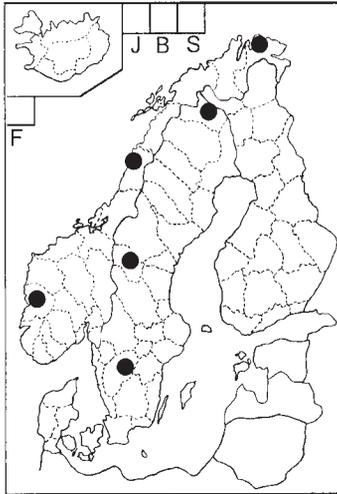
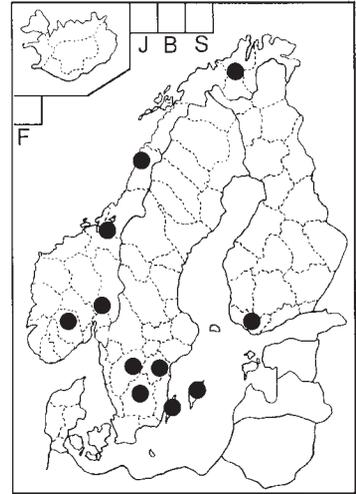
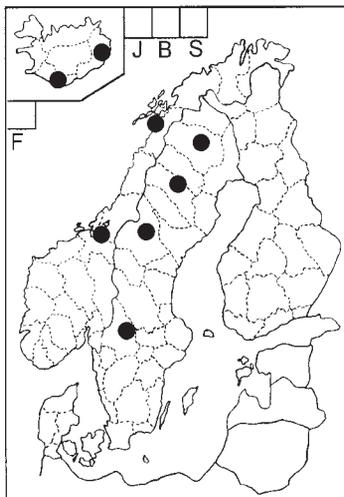
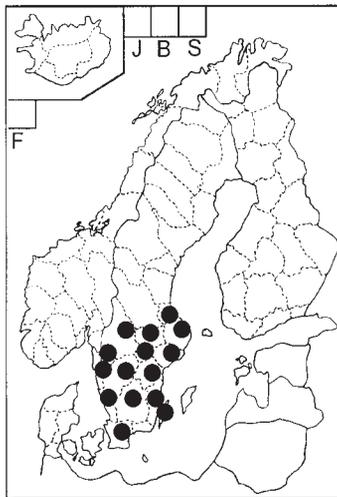
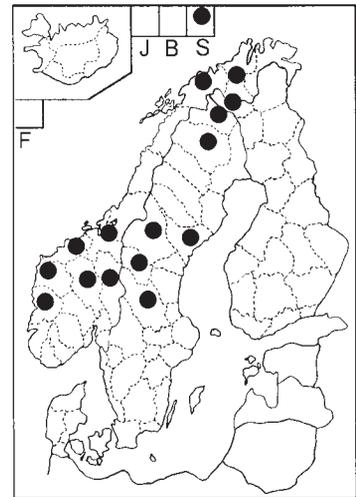
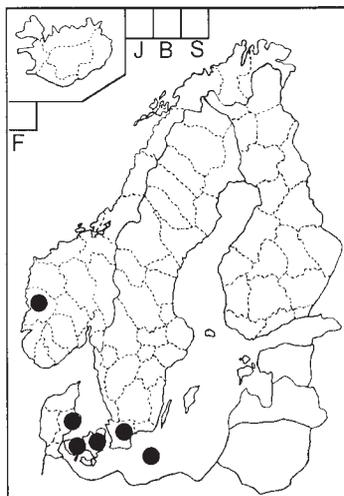
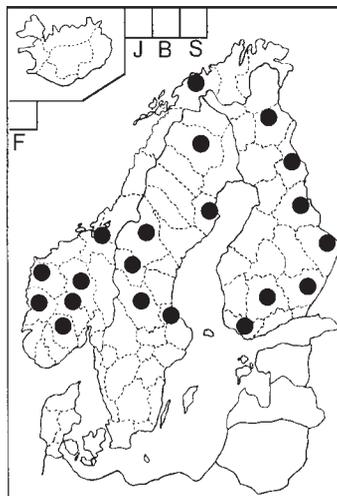
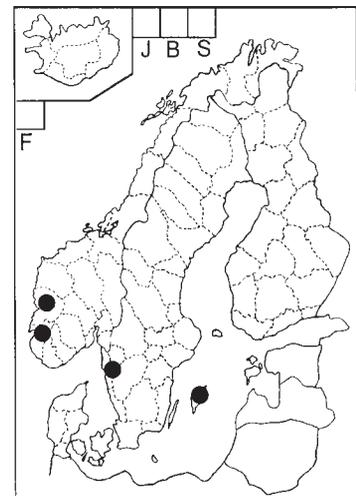
34 *Buellia stellulata*

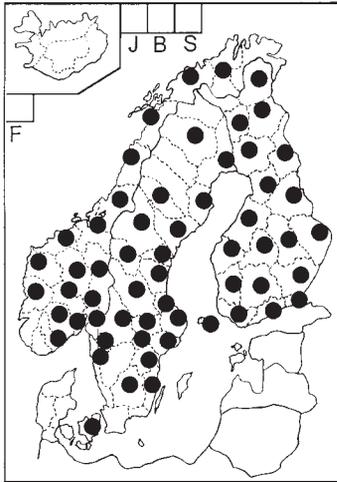


35 *Buellia subdispersa*

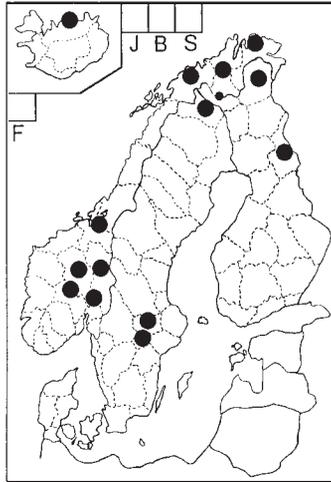


36 *Buellia tessarata*

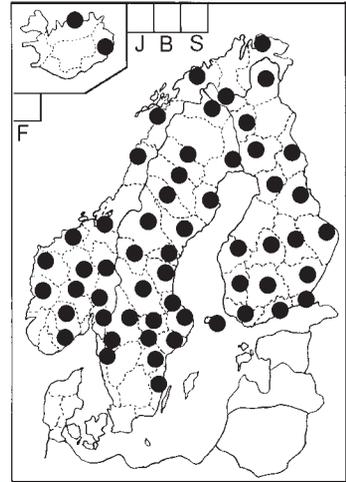
37 *Buellia triphragmioides*38 *Buellia uberior*39 *Buellia venusta*40 *Buellia vilis*41 *Buellia violaceofusca*42 *Dimelaena oreina*43 *Diploicia canescens*44 *Heterodermia speciosa*45 *Hyperphyscia adglutinata*



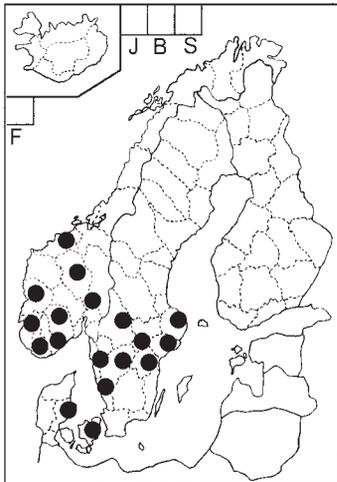
46 *Phaeophyscia ciliata*



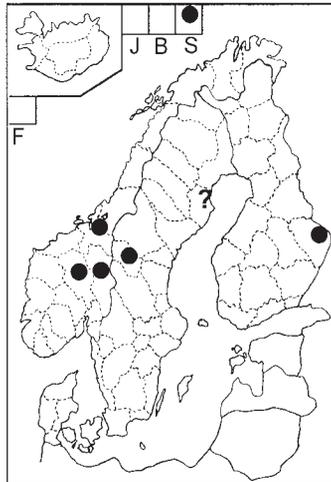
47 *Phaeophyscia constipata*



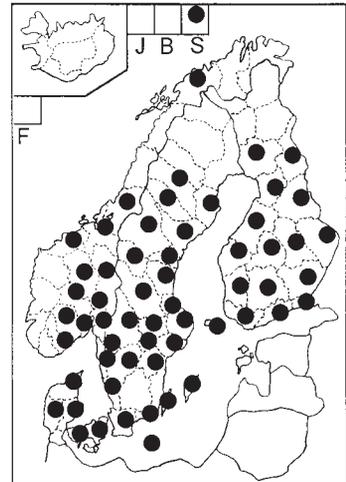
48 *Phaeophyscia endococcina*



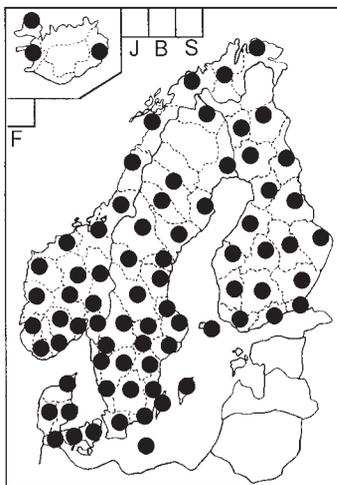
49 *Phaeophyscia endophoenicea*



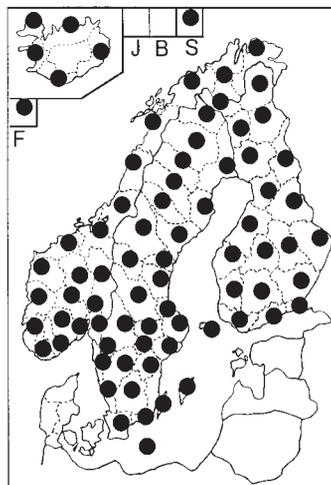
50 *Phaeophyscia kairamoi*



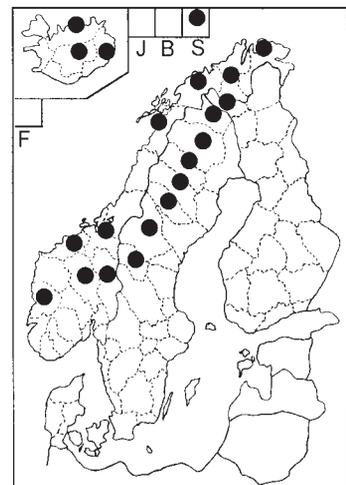
51 *Phaeophyscia nigricans*



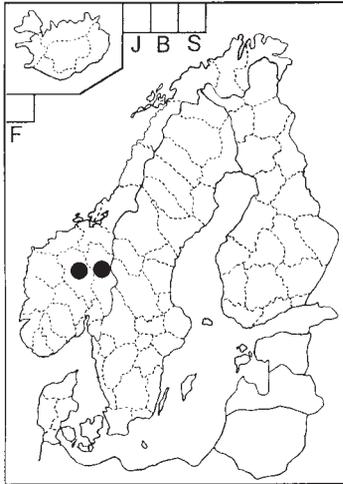
52 *Phaeophyscia orbicularis*



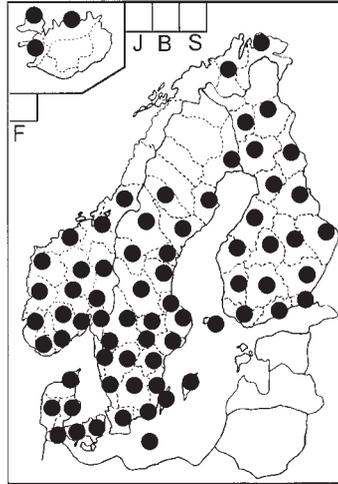
53 *Phaeophyscia sciastra*



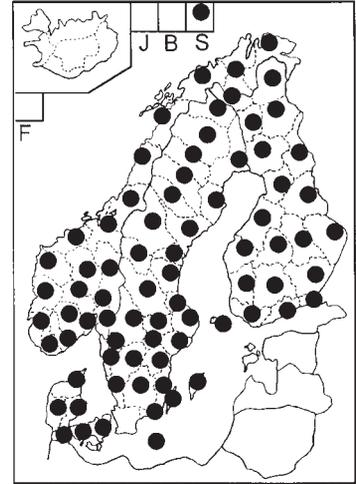
54 *Phaeorrhiza nimbose*



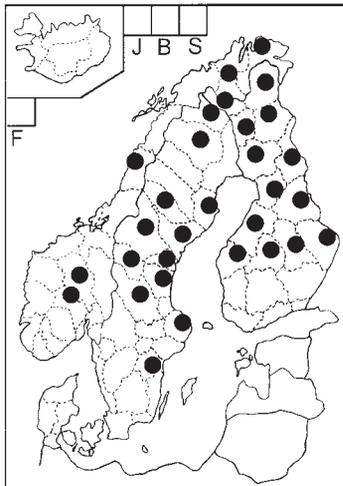
55 *Phaeorrhiza sareptana* var.
sphaerocarpa



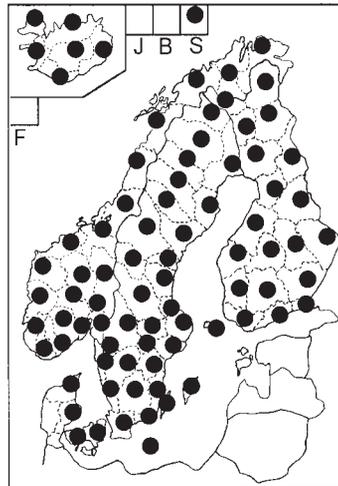
56 *Physcia adscendens*



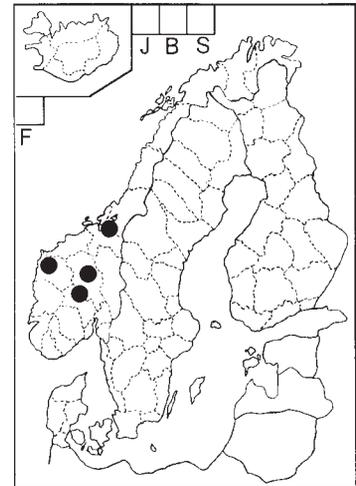
57 *Physcia aipolia*



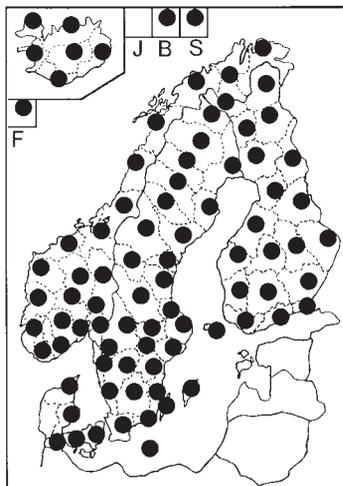
58 *Physcia aipolia* v. *alnophila*



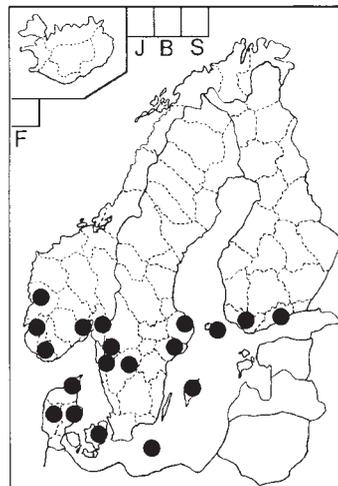
59 *Physcia caesia*



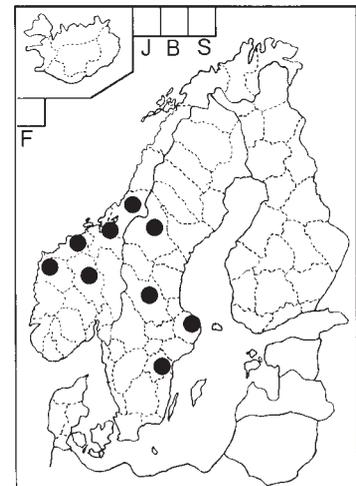
60 *Physcia dimidiata*



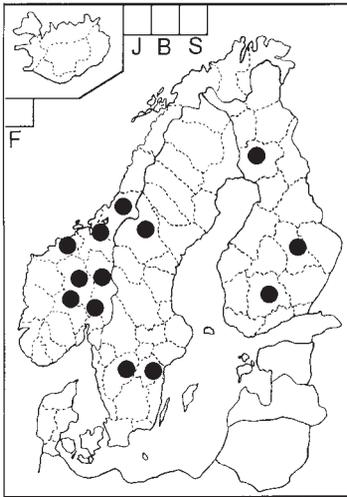
61 *Physcia dubia*



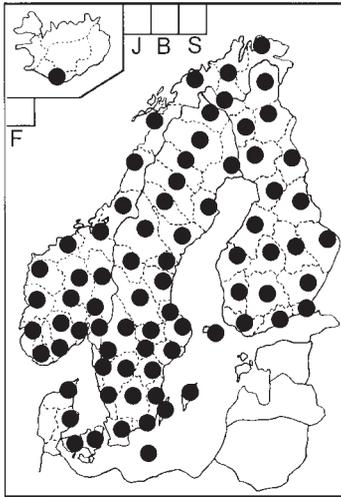
62 *Physcia leptalea*



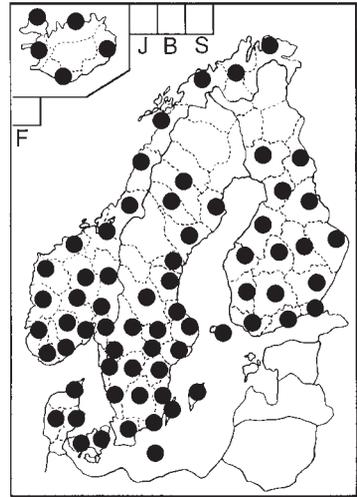
63 *Physcia magnussonii*



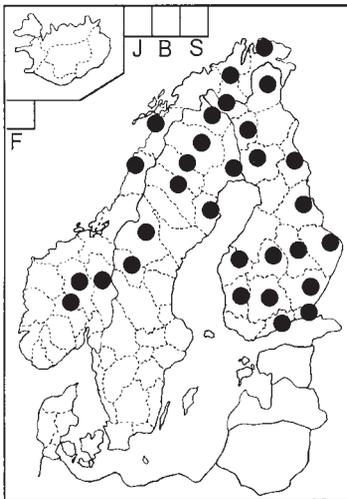
64 *Physcia phaea*



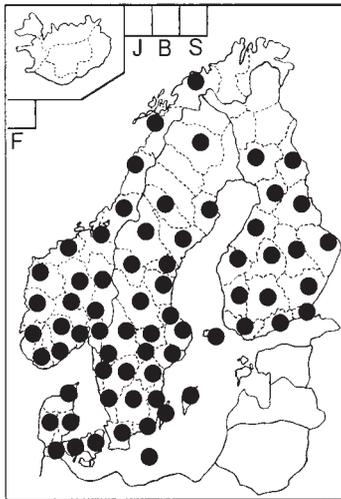
65 *Physcia stellaris*



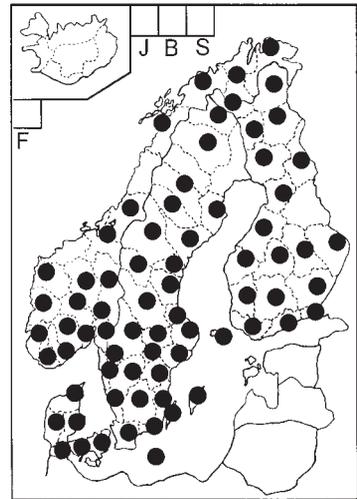
66 *Physcia tenella*



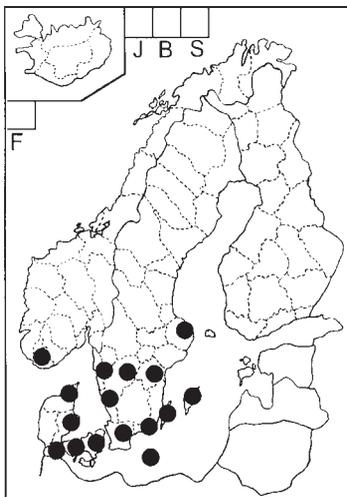
67 *Physconia detersa*



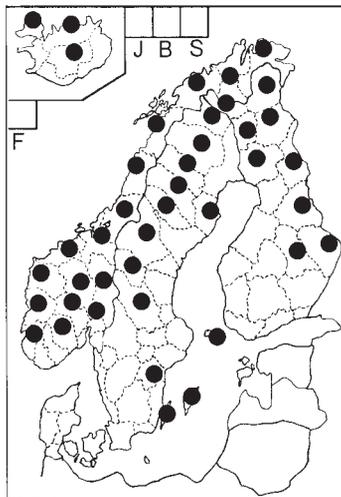
68 *Physconia distorta*



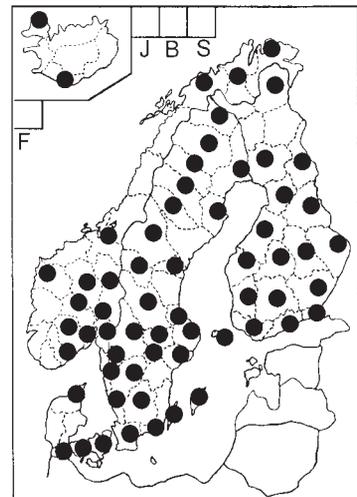
69 *Physconia enteroxantha*



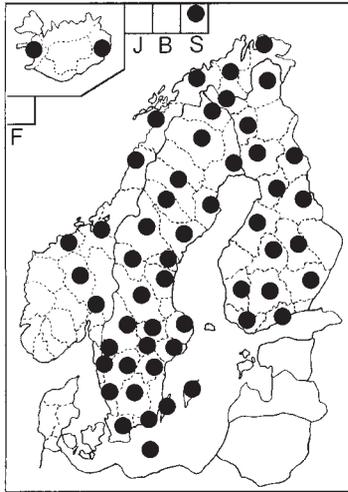
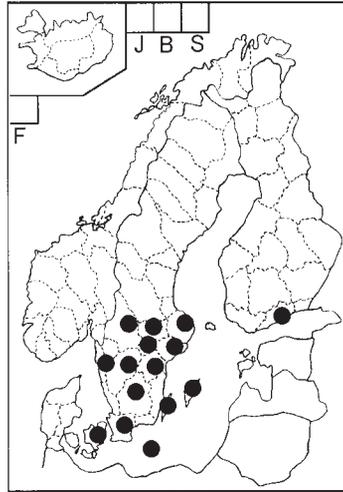
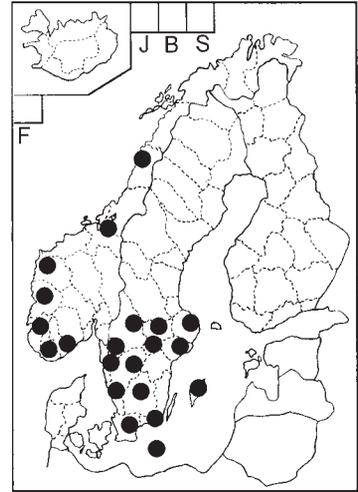
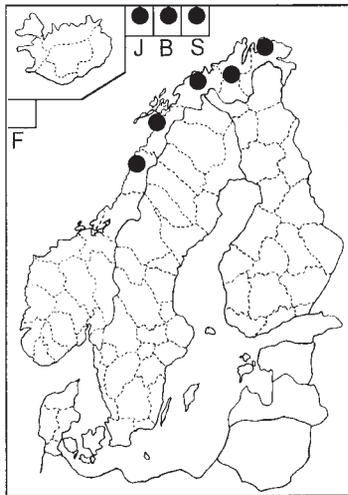
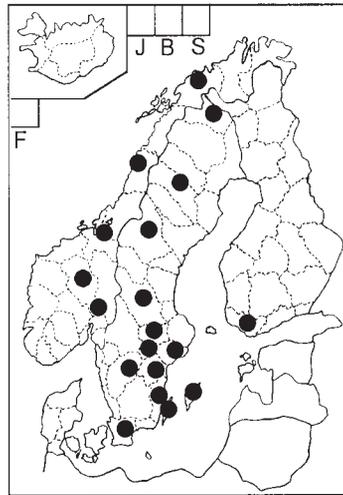
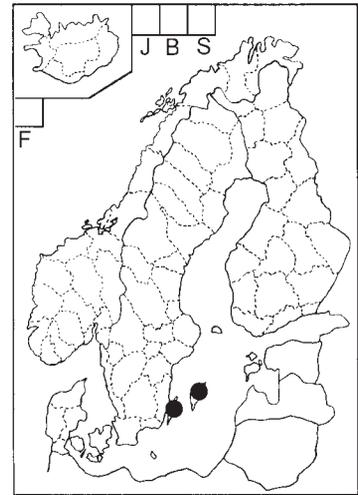
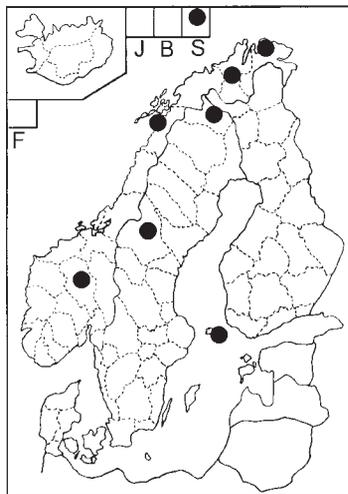
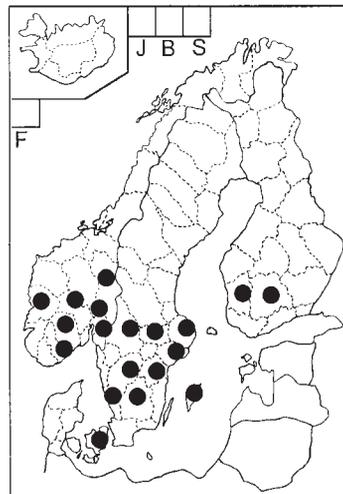
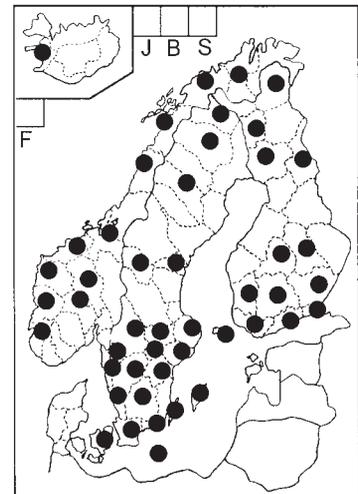
70 *Physconia grisea*

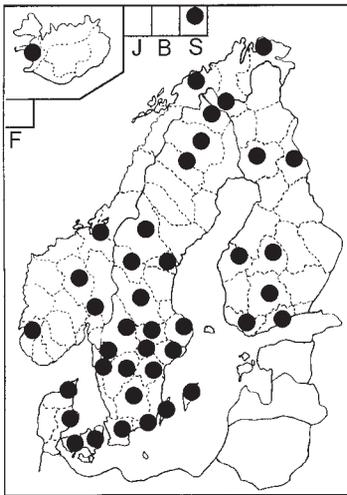


71 *Physconia muscigena*

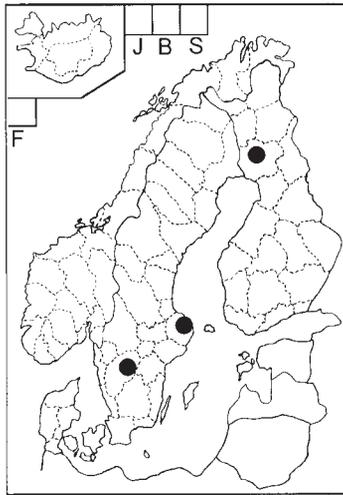


72 *Physconia perisidiosa*

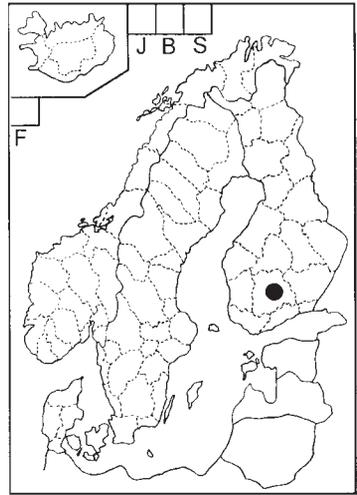
73 *Rinodina archaea*74 *Rinodina aspersa*75 *Rinodina atrocinerea*76 *Rinodina balanina*77 *Rinodina bischoffii*78 *Rinodina calcarea*79 *Rinodina calcigena*80 *Rinodina colobina*81 *Rinodina confragosa*



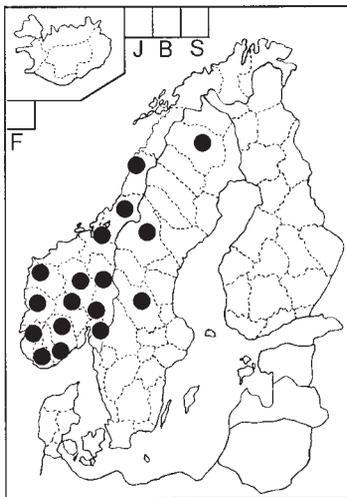
82 *Rinodina conradii*



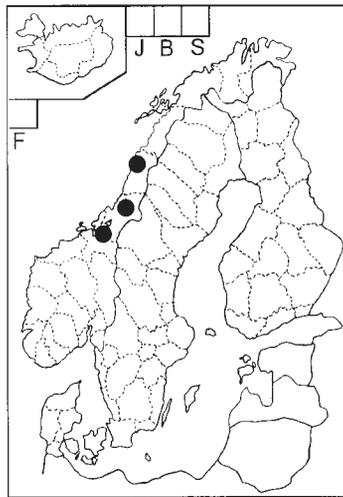
83 *Rinodina convexula*



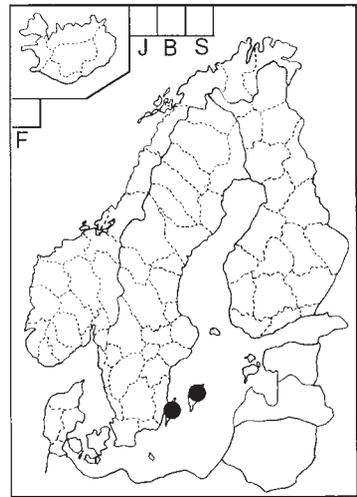
84 *Rinodina deflectens*



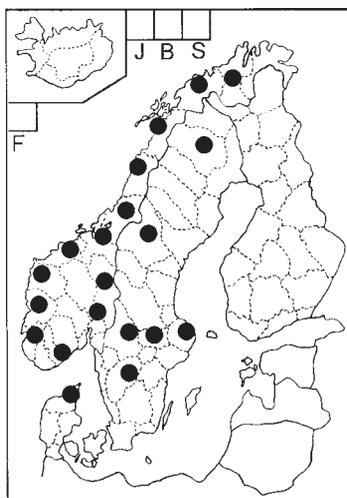
85 *Rinodina degeliana*



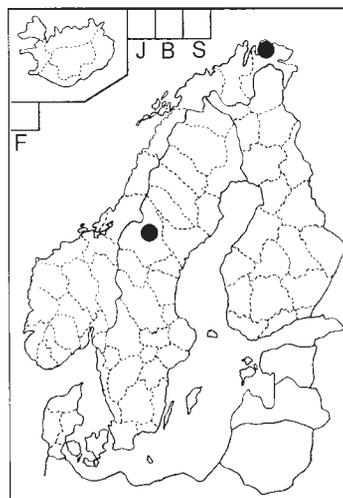
86 *Rinodina disjuncta*



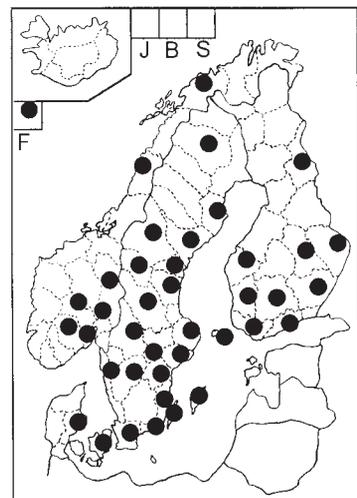
87 *Rinodina dubyana*



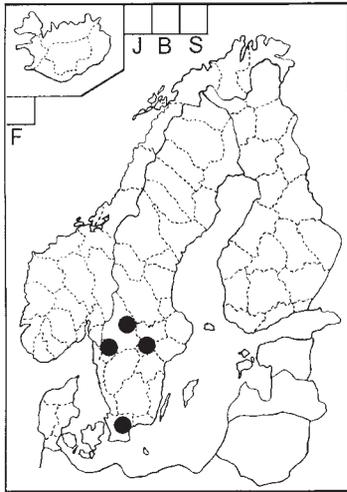
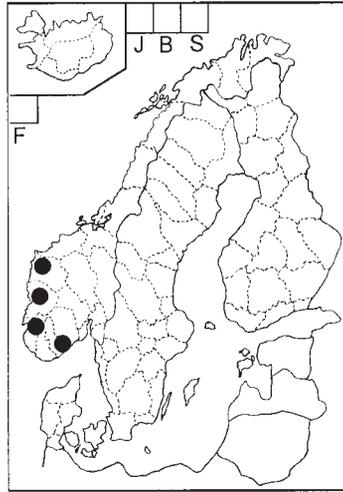
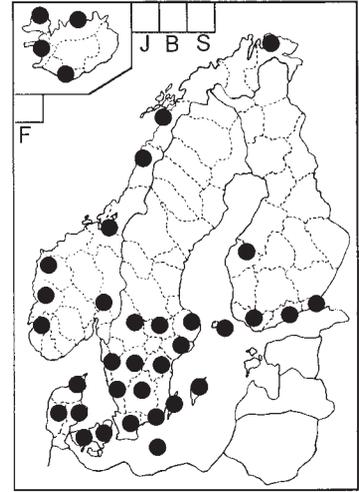
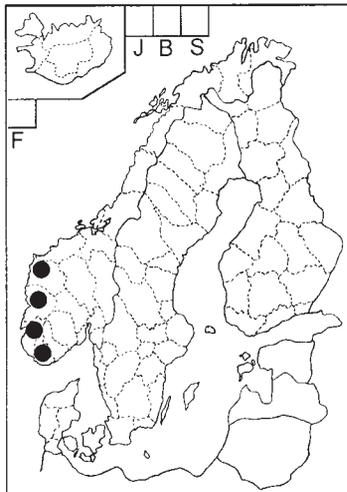
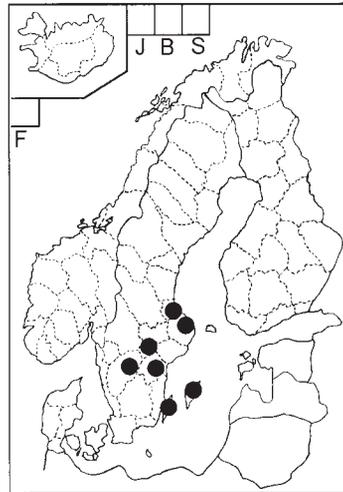
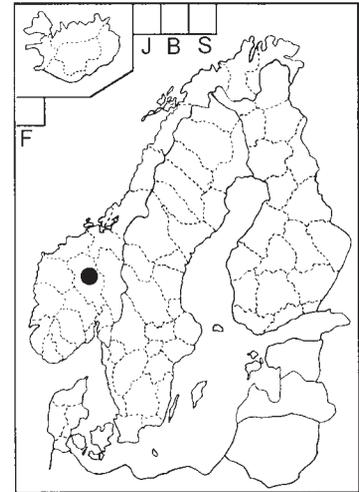
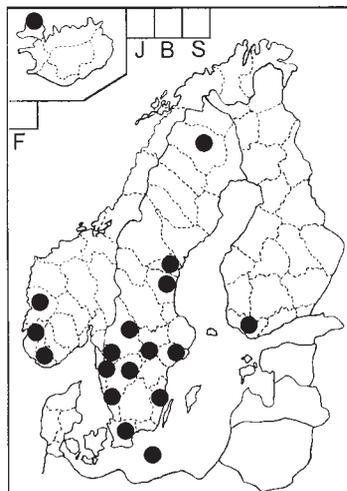
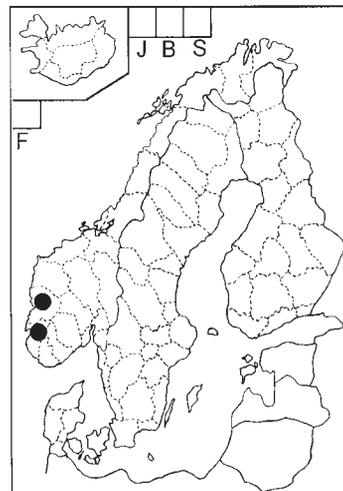
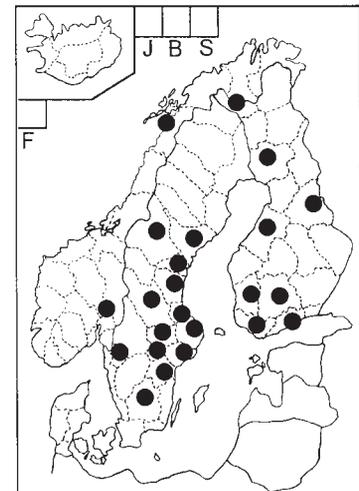
88 *Rinodina efflorescens*

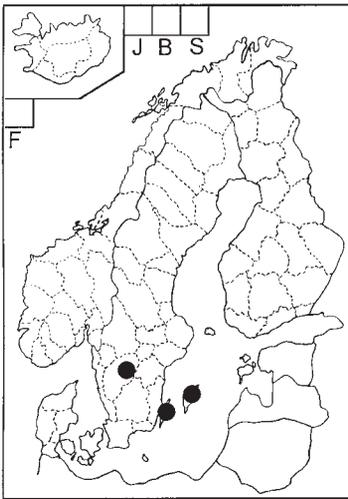


89 *Rinodina endophragma*

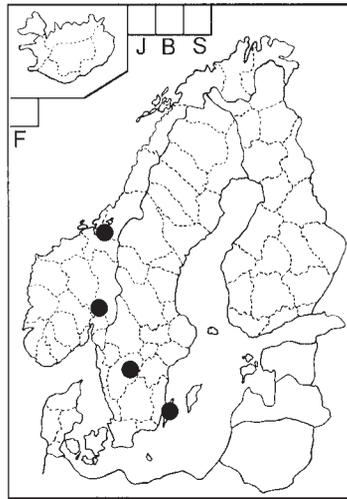


90 *Rinodina exigia*

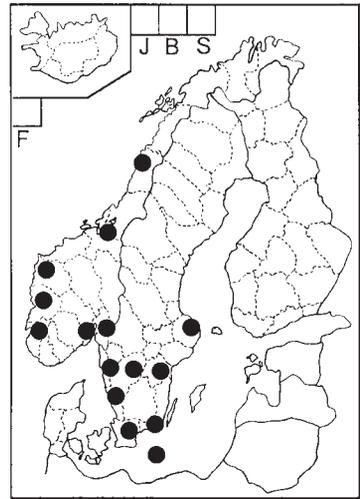
91 *Rinodina fimbriata*92 *Rinodina flavosoralifera*93 *Rinodina gennarii*94 *Rinodina griseosoralifera*95 *Rinodina immersa*96 *Rinodina insularis*97 *Rinodina interpolata*98 *Rinodina isidioides*99 *Rinodina laevigata*



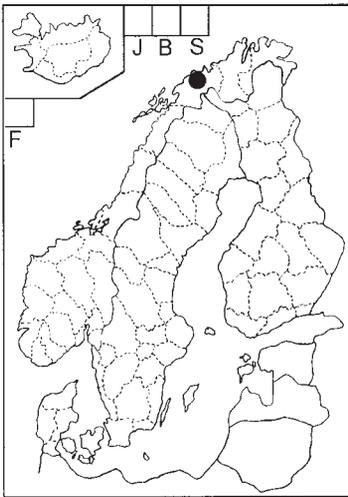
100 *Rinodina lecanorina*



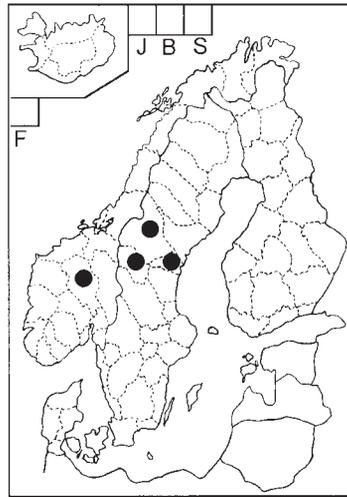
101 *Rinodina luridata*



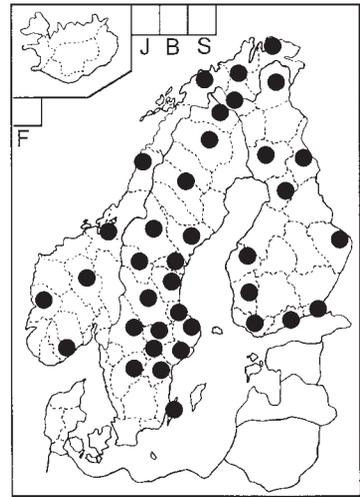
102 *Rinodina luridescens*



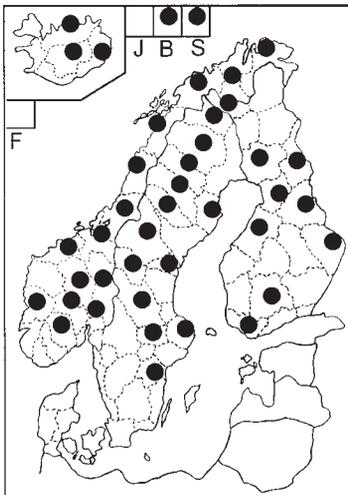
103 *Rinodina malangica*



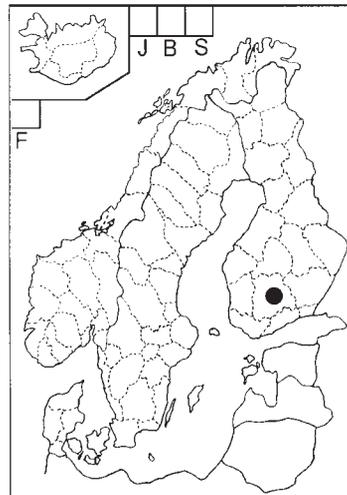
104 *Rinodina metaboliza*



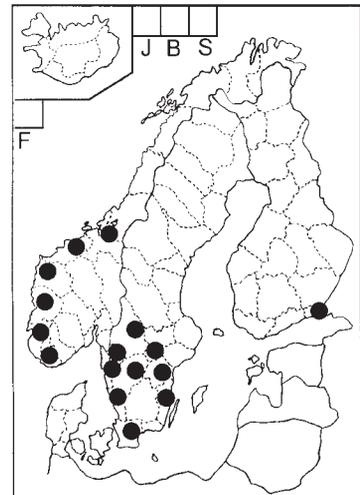
105 *Rinodina milvina*



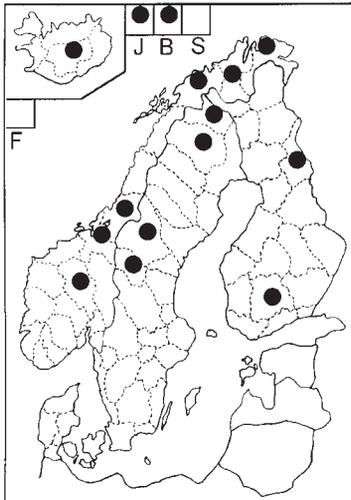
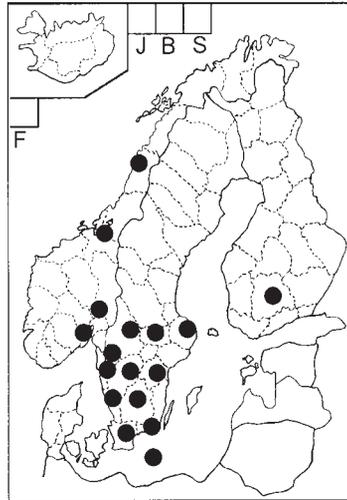
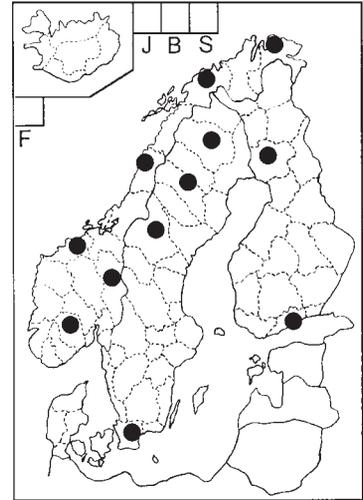
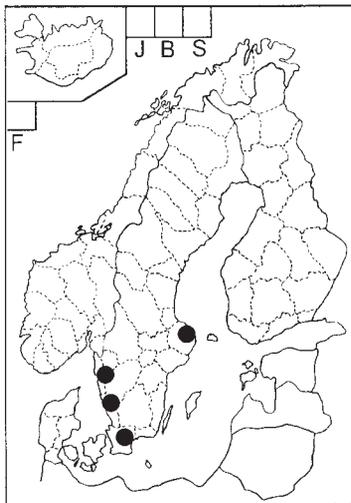
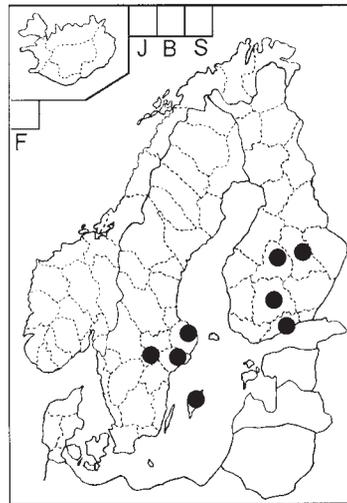
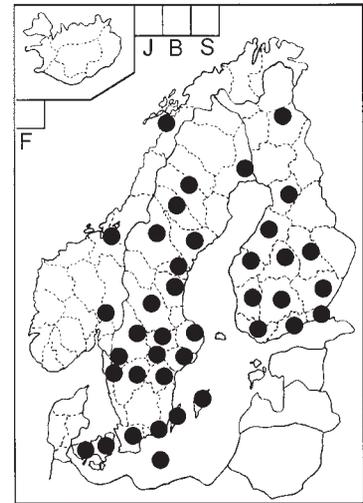
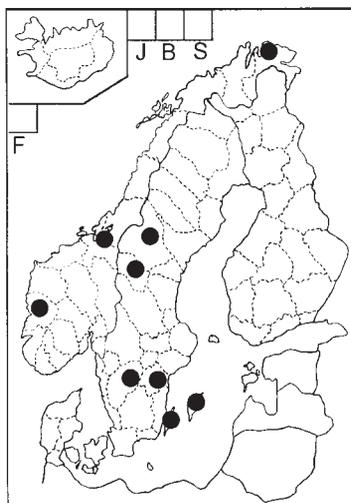
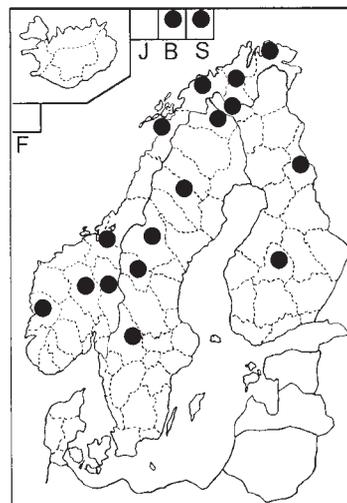
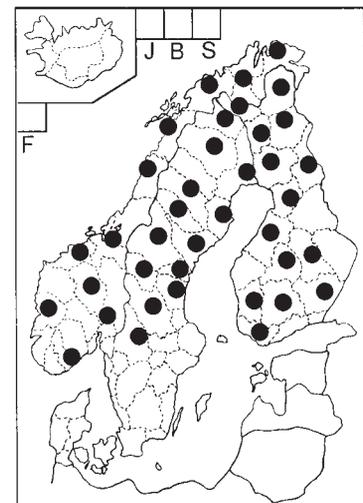
106 *Rinodina mniarea*

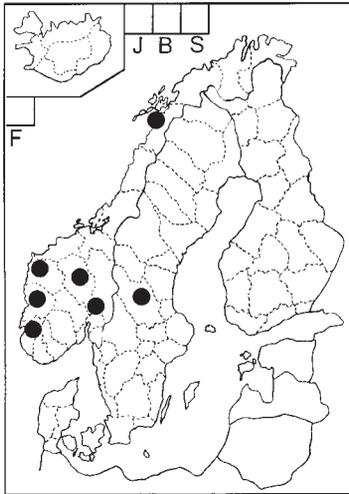


107 *Rinodina muscicola*

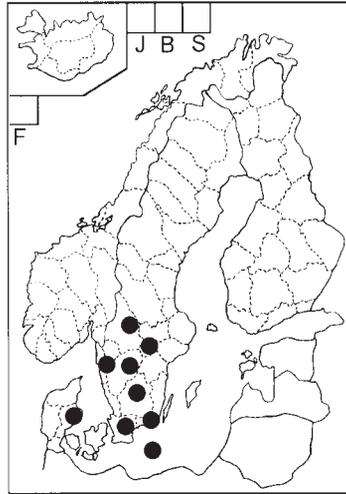


108 *Rinodina occulta*

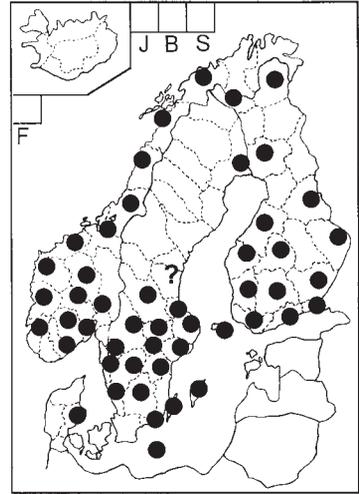
109 *Rinodina olivaceobrunnea*110 *Rinodina oxydata*111 *Rinodina parasitica*112 *Rinodina pityrea*113 *Rinodina polyspora*114 *Rinodina pyrina*115 *Rinodina rinodinoides*116 *Rinodina roscida*117 *Rinodina sententrionalis*



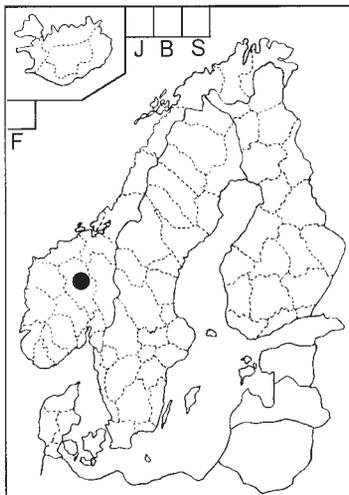
118 *Rinodina sheardii*



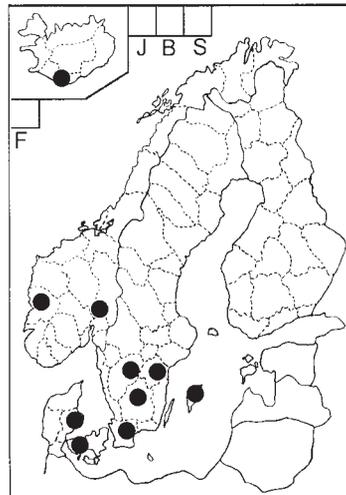
119 *Rinodina sicula*



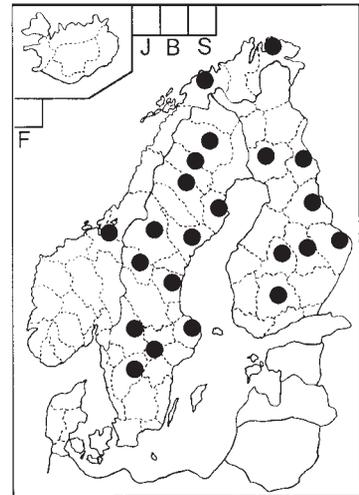
120 *Rinodina sophodes*



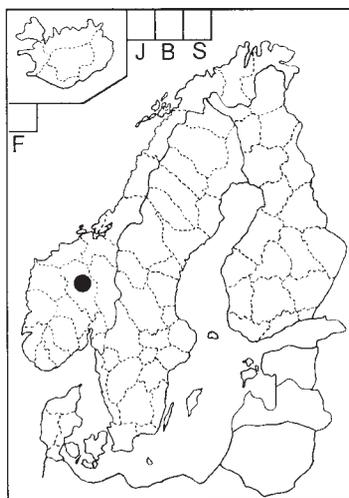
121 *Rinodina stictica*



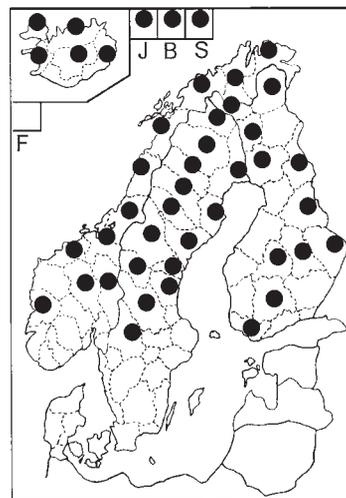
122 *Rinodina teichophila*



123 *Rinodina tephraeispis*



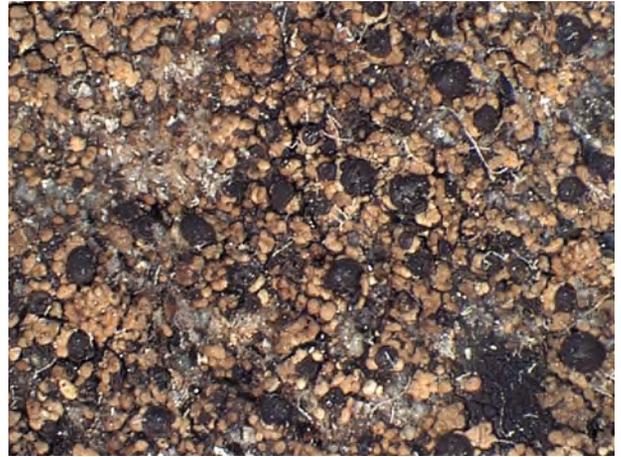
124 *Rinodina terrestris*



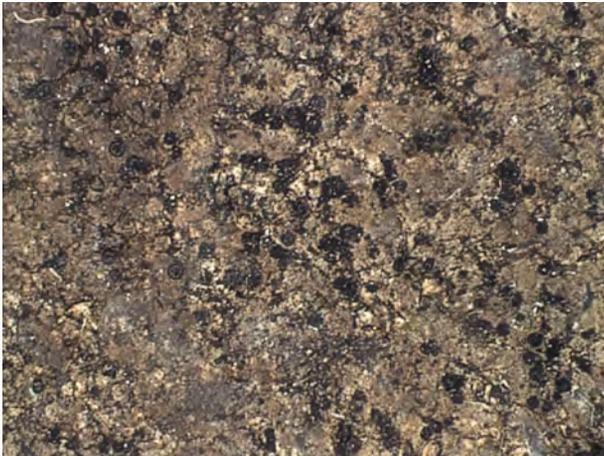
125 *Rinodina turfacea*



Amandinea cacuminum



Amandinea coniops



Amandinea lecideina



Amandinea punctata



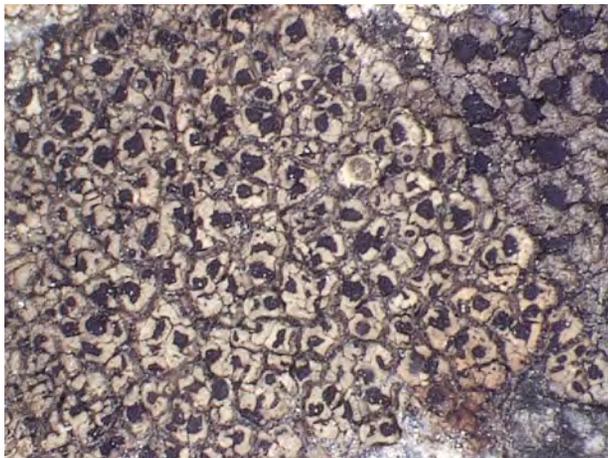
Anaptychia ciliaris



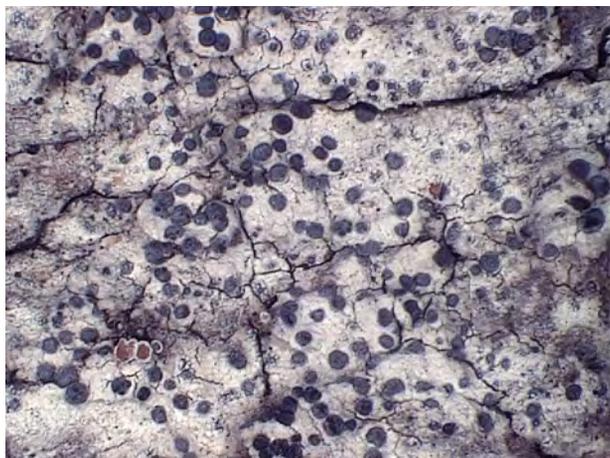
Anaptychia runcinata



Buellia adjuncta (parasite)



Buellia aethalea



Buellia alboatra



Buellia arborea



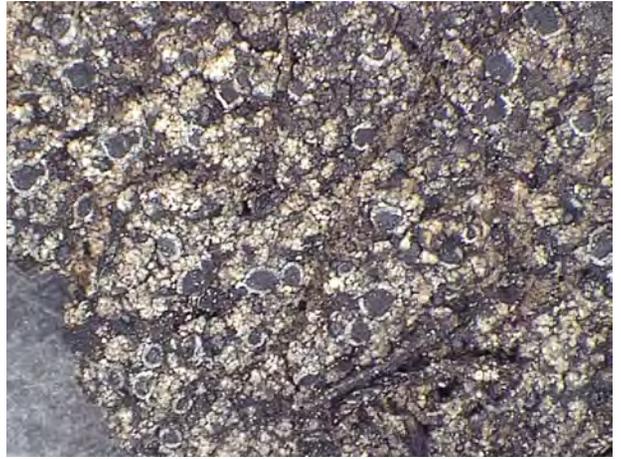
Buellia arnoldii



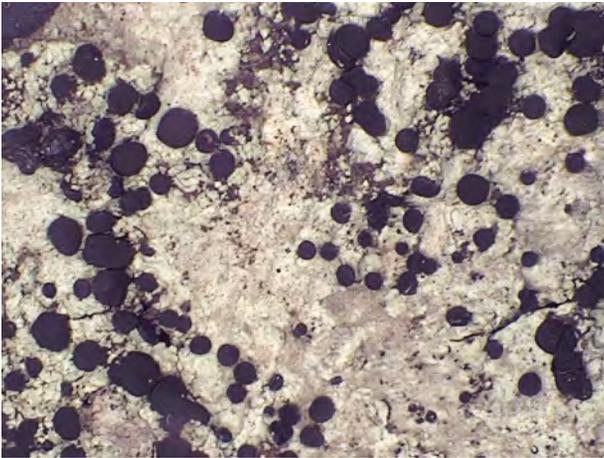
Buellia asterella



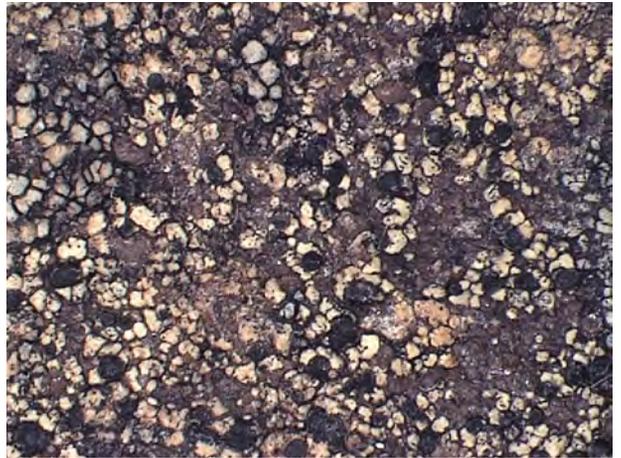
Buellia badia



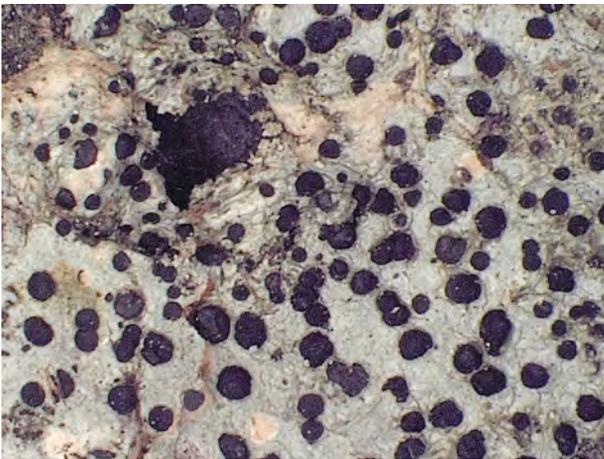
Buellia chionea



Buellia chloroleuca



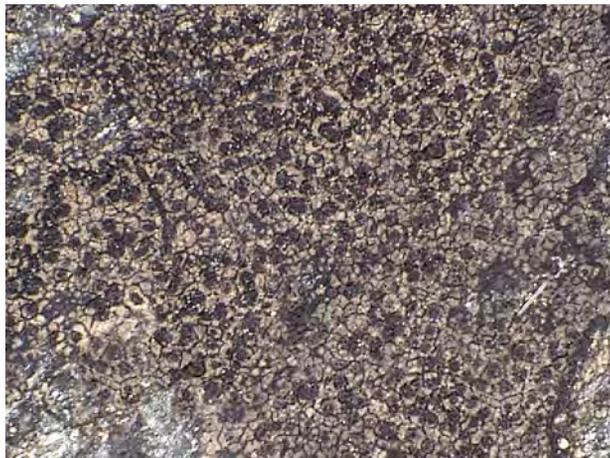
Buellia concinna



Buellia disciformis



Buellia dives



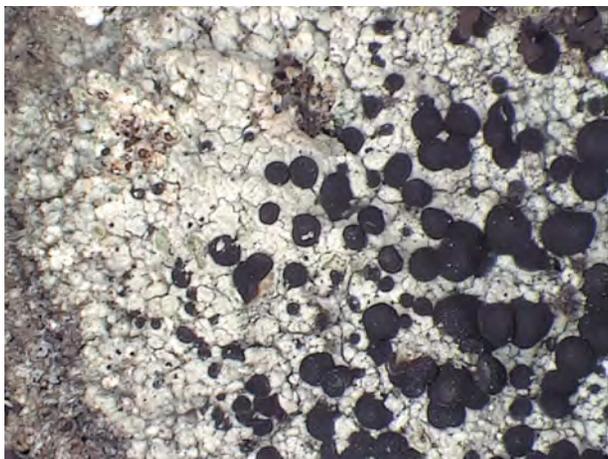
Buellia ectolecideoides



Buellia epigaea



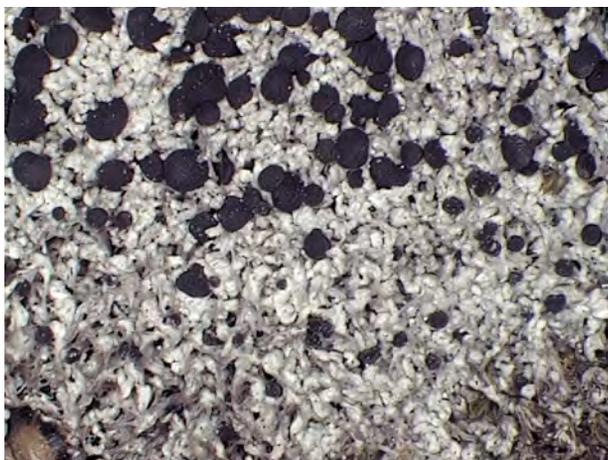
Buellia erubescens



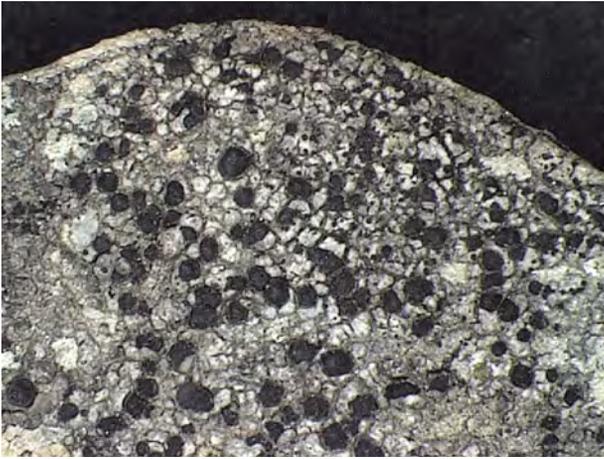
Buellia geophila



Buellia griseovirens



Buellia insignis



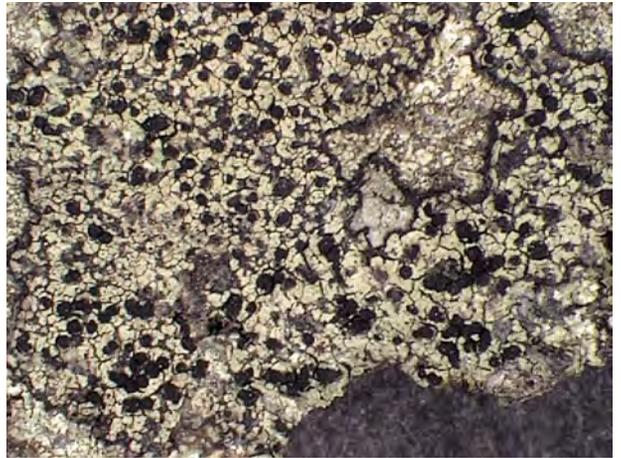
Buellia jugorum



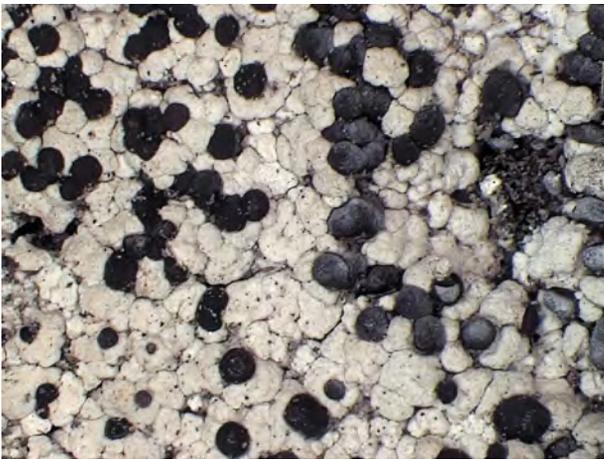
Buellia leptocline



Buellia miriquidica



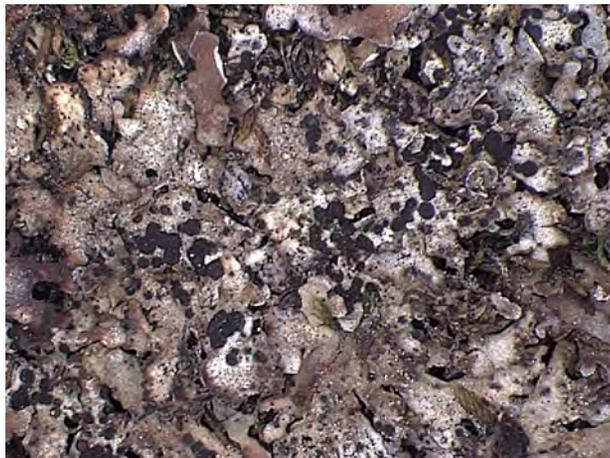
Buellia ocellata



Buellia papillata



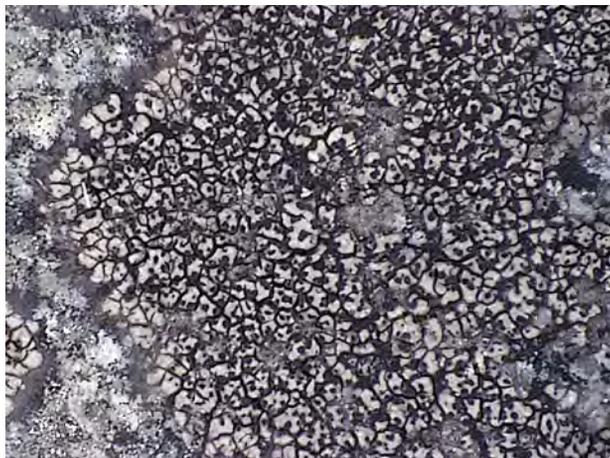
Buellia pharcidia



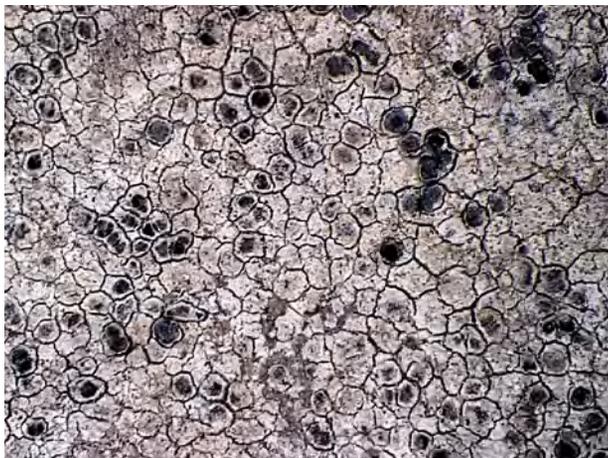
Buellia pulverulenta



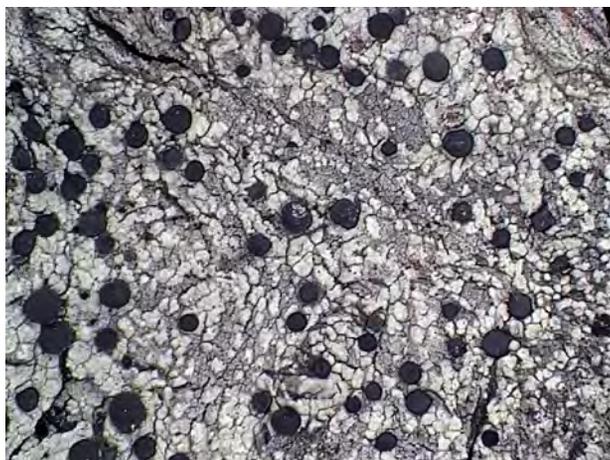
Buellia schaeereri



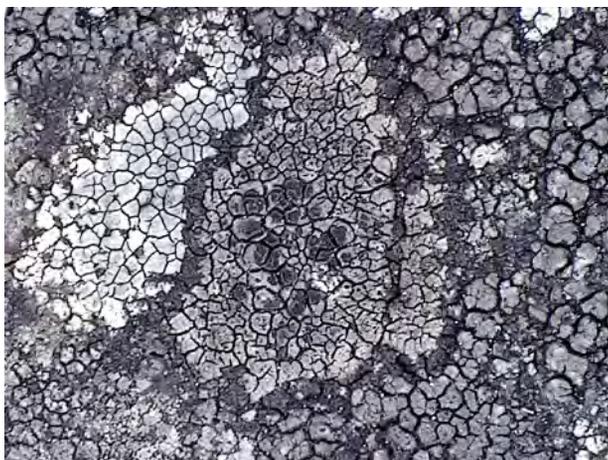
Buellia stellulata



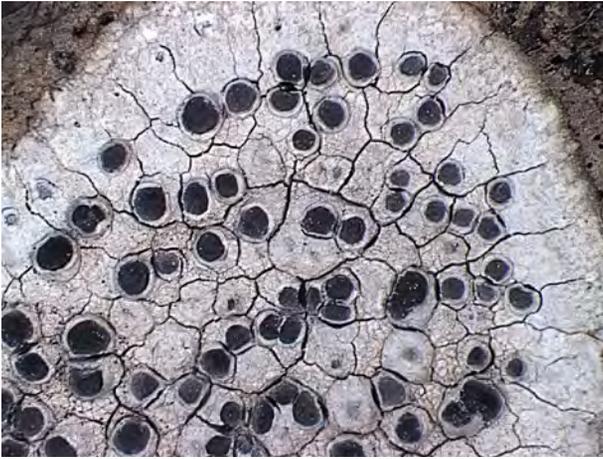
Buellia subdispersa



Buellia triphragmioides



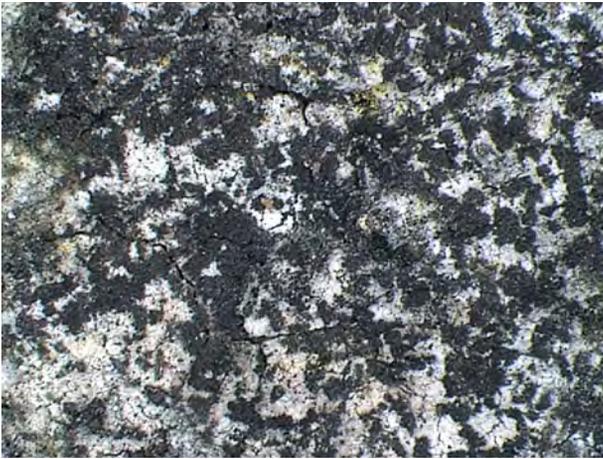
Buellia uberior



Buellia venusta



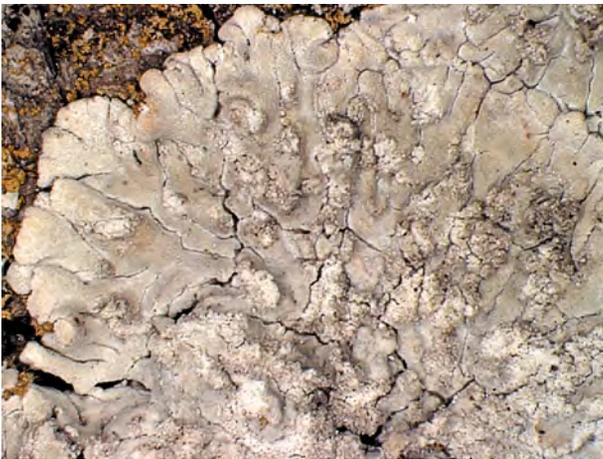
Buellia vilis



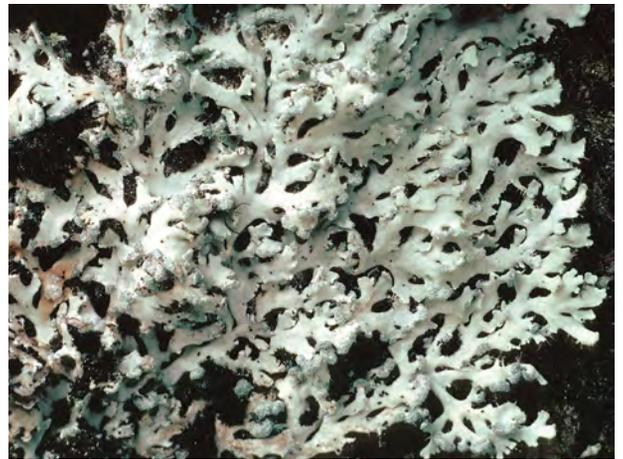
Buellia violaceofusca



Dimelaena oreina



Diploicia canescens



Heterodermia speciosa



Hyperphyscia adglutinata



Phaeophyscia ciliata



Phaeophyscia constipata



Phaeophyscia endococcinea



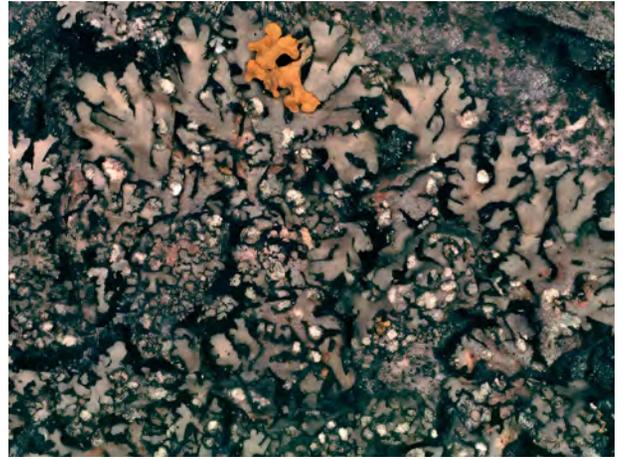
Phaeophyscia endophoenicia



Phaeophyscia kairamoi



Phaeophyscia nigricans



Phaeophyscia orbicularis



Phaeophyscia sciastra



Phaeorrhiza nimbosa



Physcia adscendens



Physcia aipolia var. *aipolia*



Physcia aipolia var. *alnophila*



Physcia caesia



Physcia dimidiata



Physcia dubia



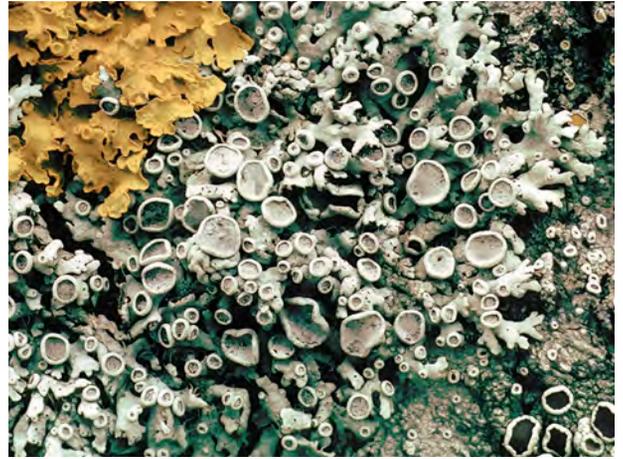
Physcia leptalea



Physcia magnussonii



Physcia phaea



Physcia stellaris



Physcia tenella



Physconia detersa



Physconia distorta



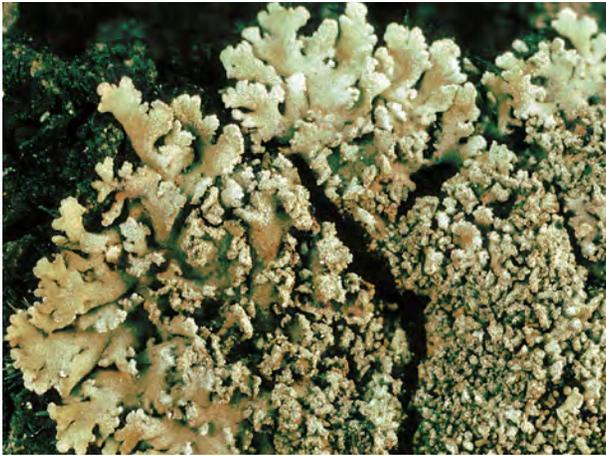
Physconia enteroxantha



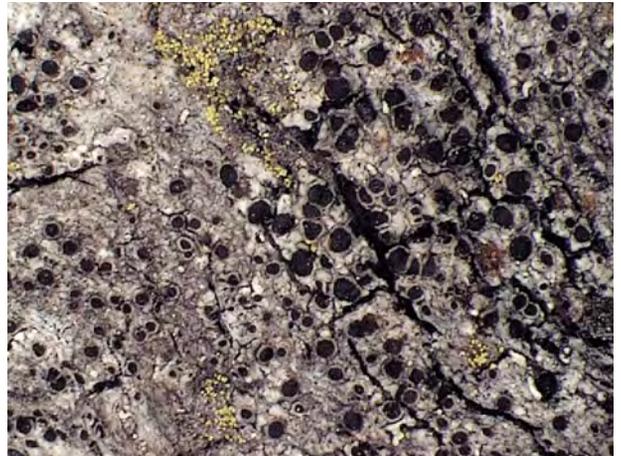
Physconia grisea



Physconia muscigena



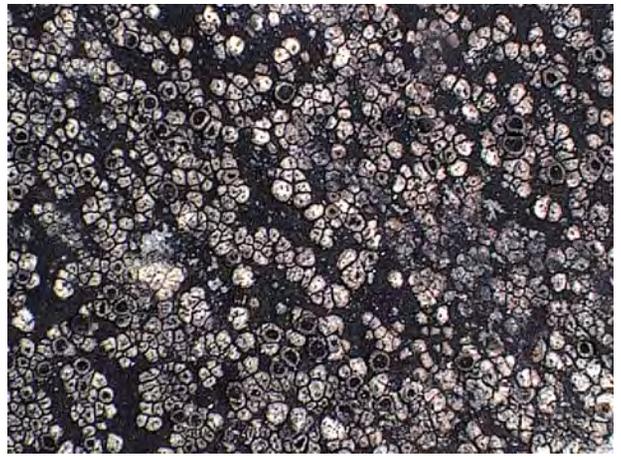
Physconia perisidiosa



Rinodina archaea



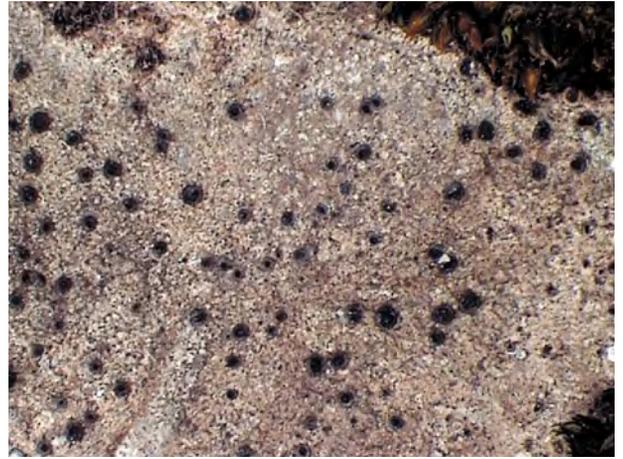
Rinodina aspera



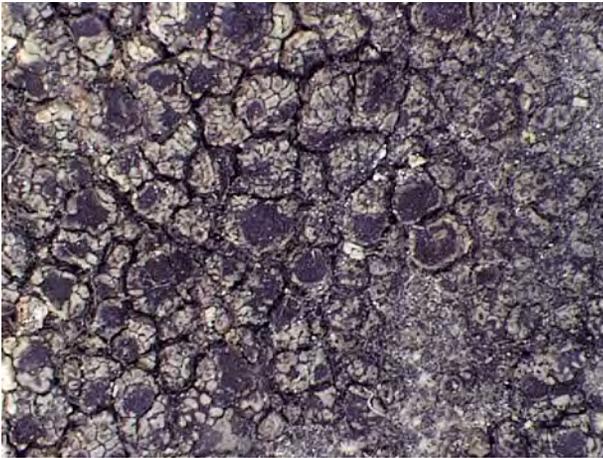
Rinodina atrocinerea



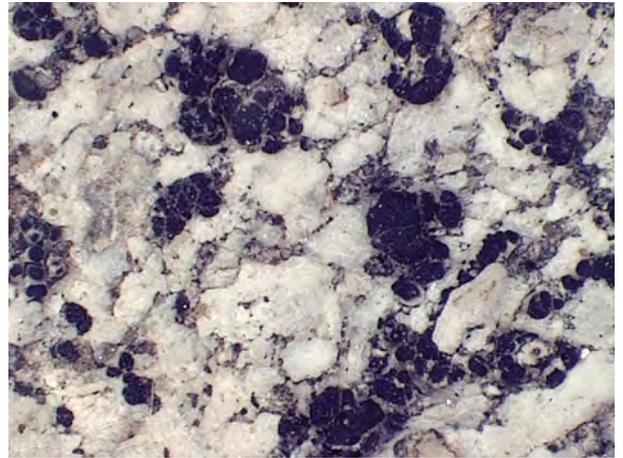
Rinodina balanina



Rinodina bischoffii



Rinodina calcarea



Rinodina calcigena



Rinodina colobina



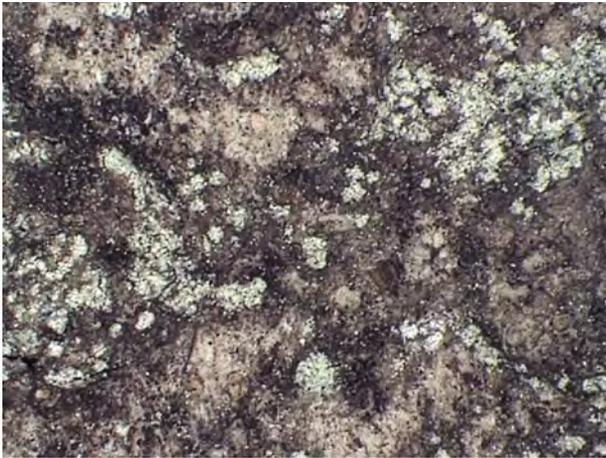
Rinodina confragosa



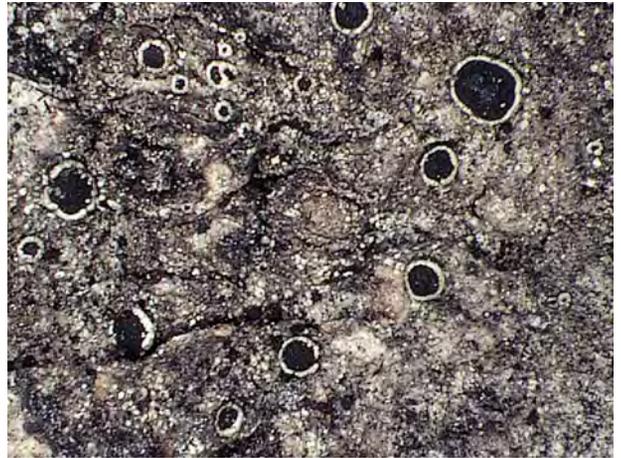
Rinodina conradii



Rinodina convexula



Rinodina degeliana



Rinodina disjuncta



Rinodina dubyana



Rinodina efflorescens



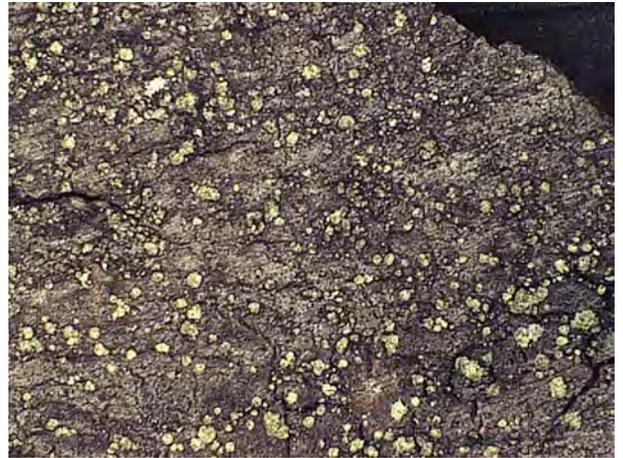
Rinodina endophragma



Rinodina exigua



Rinodina fimbriata



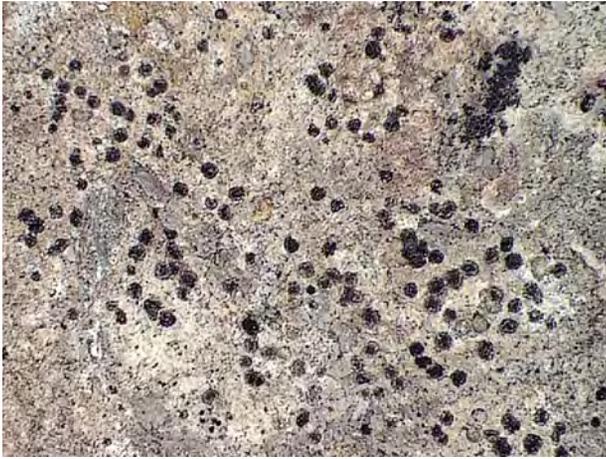
Rinodina flavosoralifera



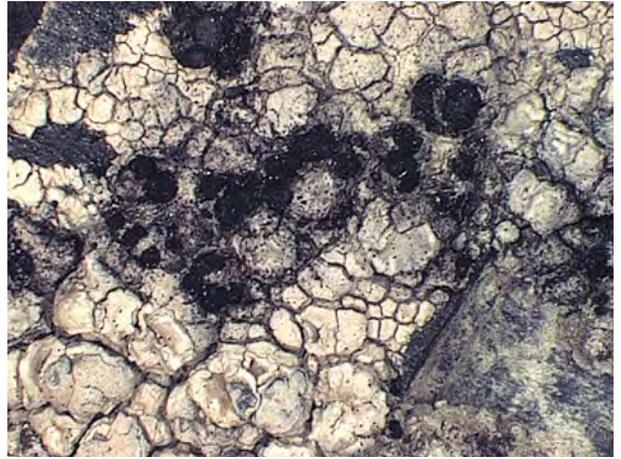
Rinodina gennarii



Rinodina griseosoralifera



Rinodina immersa



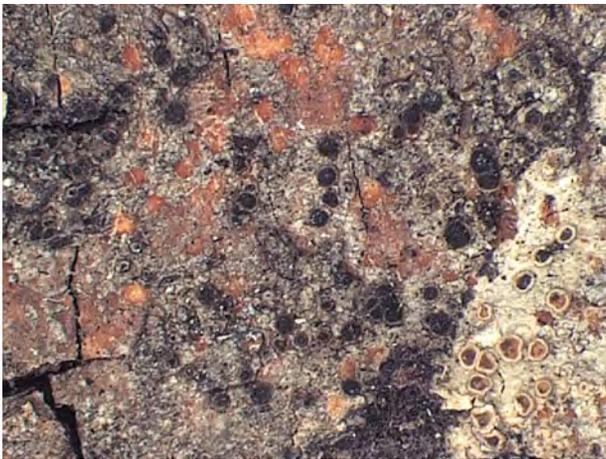
Rinodina insularis



Rinodina interpolata



Rinodina isidioides



Rinodina laevigata



Rinodina lecanorina



Rinodina luridata



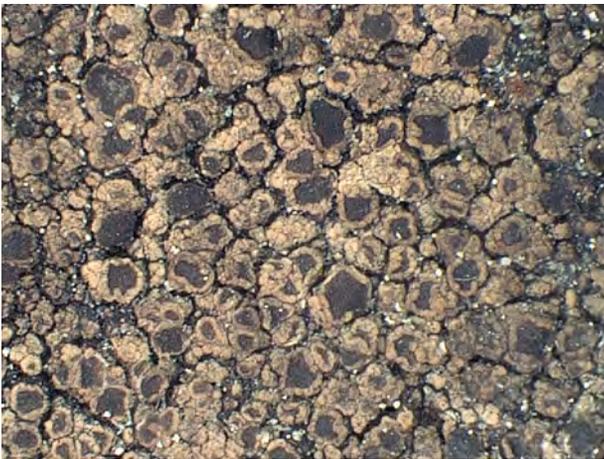
Rinodina luridescens



Rinodina malangica



Rinodina metaboliza



Rinodina milvina



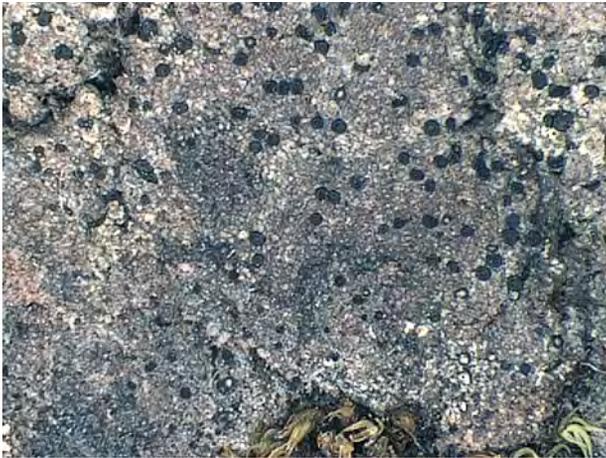
Rinodina mniarea



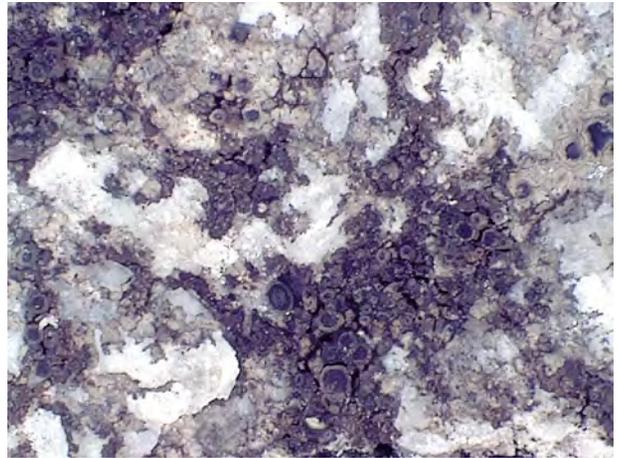
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Rinodina olivaceobrunnea



Rinodina oxydata



Rinodina parasitica



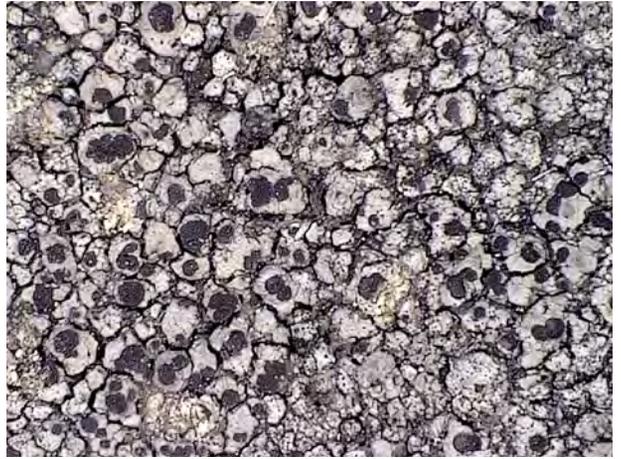
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Rinodina polyspora



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Rinodina rinodinooides



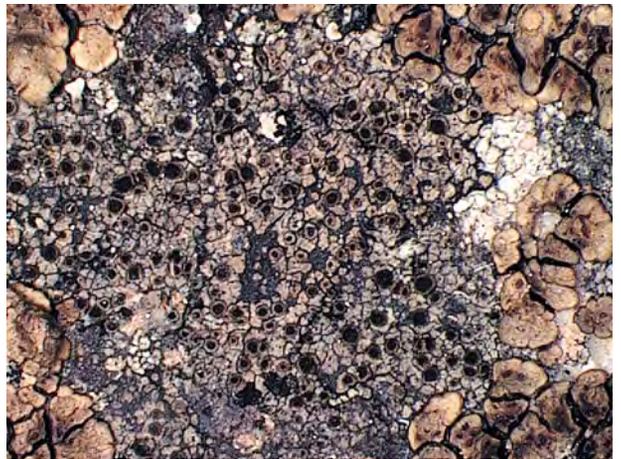
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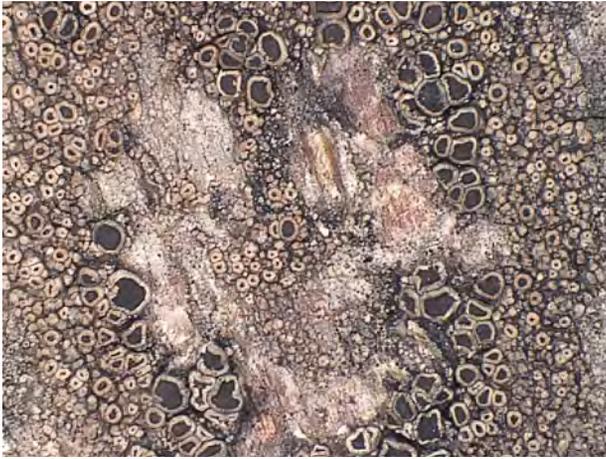
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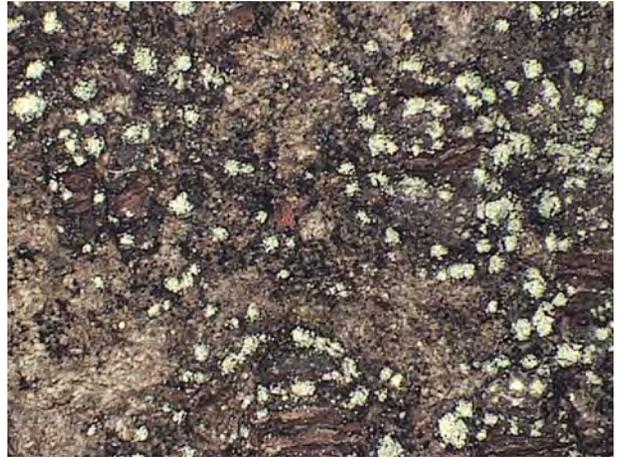
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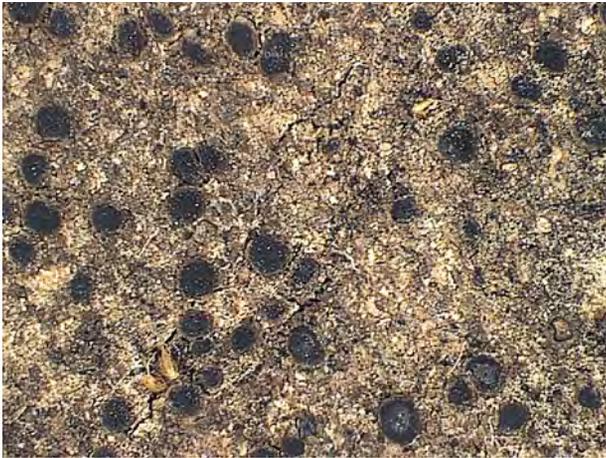
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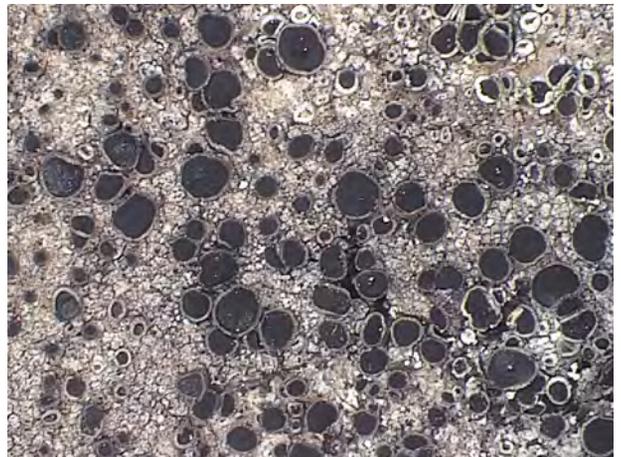
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Physcia subalbinea Nyl. = *Physcia caesia*
Physcia subobscura Nyl. = *Physcia tenella*
Physcia tenella var. *marina* (A. Nyl.) Lyngby = *Physcia tenella*
Physcia teretiuscula (Ach.) Lyngby = *Physcia dubia*
Physcia tribacia s. auct. non (Ach.) Nyl. = *Physcia dubia*
Physcia wahlenbergii Lyngby = *Physcia dubia*
Physcia wainioi Räsänen = *Physcia caesia*
Physciopsis adglutinata (Flörke) M. Choisy = *Hyperphyscia adglutinata*
Physconia pulverulacea Moberg = *Physconia distorta*
Physconia pulverulenta auct. = *Physconia distorta*
Rhizocarpon efflorescens Th. Fr. = *Buellia griseovirens*
Rinodina amniocola (Ach.) Körb. = *Rinodina mniaraea*
Rinodina archaea f. *paupera* H. Magn. = *Rinodina archaea*
Rinodina archaeoides H. Magn. = *Rinodina olivaceobrunnea*
Rinodina arctica H. Magn. = *Rinodina archaea*
Rinodina arenaria (Hepp) Th. Fr. = *Rinodina tephraspis*
Rinodina arnoldii auct. (non H. Mayrhofer & Poelt) = *Rinodina milvina*
Rinodina badiella (Nyl.) Th. Fr. = *Rinodina tephraspis*
Rinodina biatorina Körb. = *Rinodina oxydata*
Rinodina biatorina var. *biatorina* Berg = *Amandinea lecideina*
Rinodina cacuminum (Th. Fr.) Malme = *Amandinea cacuminum*
Rinodina caesiella (Flörke) Flot. = *Rinodina confragosa*
Rinodina calcarea var. *obscurata* Arnold = *Rinodina teichophila*
Rinodina candida (Schaer.) Arnold = *Rinodina oxydata*
Rinodina cinereovirens (Vain.) Vain. = *Rinodina turfacea* var. *cinereovirens*
Rinodina colletica (Flörke) Arnold = *Rinodina teichophila*
Rinodina colobina f. *saxicola* de Lesd. = *Rinodina pityrea*
Rinodina concava de Lesd. = *Rinodina oxydata*
Rinodina confragosa var. *dispersa* Räsänen = *Rinodina confragosa*
Rinodina confragosa var. *exterior* (Nyl.) H. Olivier = *Rinodina confragosa*
Rinodina confragosa var. *extrusa* (Vain.) H. Olivier = *Rinodina confragosa*
Rinodina coniopta (Nyl.) Hav. = *Rinodina luridescens*
Rinodina conradii f. *luxurians* H. Magn. = *Rinodina conradii*
Rinodina conradii f. *saepincola* Körb. = *Rinodina conradii*
Rinodina conradii var. *paupercula* (Nyl.) Branth & Rostr. = *Rinodina conradii*
Rinodina contribuens (Nyl.) Boistel = *Rinodina oxydata*
Rinodina crassescens (Nyl.) Arnold = *Rinodina confragosa*
Rinodina demissa auct. = *Rinodina gennarii*
Rinodina demissa f. *cinerascens* H. Magn. = *Rinodina gennarii*
Rinodina diplocheila f. *caesiascens* H. Magn. = *Rinodina interpolata*
Rinodina diplocheila f. *luxurians* H. Magn. = *Rinodina interpolata*
Rinodina diplocheila sensu H. Magn. p.p. = *Rinodina interpolata*

- Rinodina diplocheila* Vain. ex H. Magn. = *Rinodina occulta*
Rinodina discolor (Hepp) Arnold = *Rinodina oxydata*
Rinodina dispersella (Vain.) Vain. = *Rinodina septentrionalis*
Rinodina dissimilis Anzi = *Rinodina oxydata*
Rinodina euryspora Zahlbr. = *Rinodina luridata*
Rinodina exigua f. *lecideina* (Nyl.) Th. Fr. = *Rinodina archaea*
Rinodina exigua f. *trabicola* Arnold = *Rinodina exigua*
Rinodina exigua var. *faticens* Th. Fr. = *Rinodina aspera*
Rinodina exigua var. *inundata* Blomberg ex Th. Fr. = *Rinodina fimbriata*
Rinodina exigua var. *obscurata* H. Magn. = *Rinodina gennarii*
Rinodina fatiscens (Th. Fr.) Vain. = *Rinodina aspera*
Rinodina firma (Nyl.) Arnold = *Rinodina confragosa*
Rinodina glebulosa (Arnold) Arnold = *Rinodina tephrospis*
Rinodina granulans Vain. Swedish material = *Rinodina metaboliza*
Rinodina griseofusca (Nyl.) H. Olivier = *Rinodina deflectens*
Rinodina hookeri (Fr.) Dalla Torre & Sarnth. = *Rinodina mniaraea* var. *mniaraeiza*
Rinodina hueiana (Harm.) H. Olivier = *Rinodina efflorescens*
Rinodina hyperborea H. Magn. = *Rinodina septentrionalis*
Rinodina intuta (Nyl.) H. Olivier = *Rinodina oxydata*
Rinodina iodes H. Mayrhofer & Poelt var. *iodes* = *Rinodina luridata*
Rinodina iodes var. *immersa* H. Mayrhofer & Cl. Roux = *Rinodina luridata*
Rinodina kornhuberi Zahlbr. = *Rinodina exigua*
Rinodina laxa H. Magn. Norwegian material = *Rinodina archaea*
Rinodina lecideina H. Mayrhofer & Poelt = *Amandinea lecideina*
Rinodina lecideoides (Nyl.) Kernst. = *Rinodina archaea*
Rinodina lecideoides var. *cinerea* H. Magn. = *Rinodina archaea*
Rinodina lecidotropa (Nyl.) Zahlbr. = *Rinodina oxydata*
Rinodina leprosa (Schaeer.) A. Massal. = *Rinodina colobina*
Rinodina leprosa var. *lecideina* A. Massal. = *Rinodina pityrea*
Rinodina lignaria Swedish material = *Rinodina archaea*
Rinodina maculiformis (Hepp) Arnold = *Rinodina pyrina*
Rinodina mediterranea (Stizenb.) Flagey = *Rinodina dubyana*
Rinodina melanocarpa Müll. Arg. = *Rinodina rinodinooides*
Rinodina metaboliza f. *evoluta* H. Magn. = *Rinodina metaboliza*
Rinodina milvina var. *amphibolitica* Räsänen = *Rinodina parasitica*
Rinodina milvina var. *karelica* Räsänen = *Rinodina milvina*
Rinodina milvina var. *scopulina* (Nyl.) H. Olivier = *Rinodina milvina*
Rinodina milvina var. *subdeflectens* (Vain.) Zahlbr. = *Amandinea cacuminum*
Rinodina mniaraea f. *biatorina* (Nyl.) Arnold = *Rinodina mniaraea* var. *mniaraeiza*
Rinodina mniaraea var. *chrysopasta* (Lett.) Zahlbr. = *Rinodina mniaraea* var. *cinnamomea*
Rinodina mniaraea var. *normalis* Th. Fr. = *Rinodina mniaraea*
Rinodina mniaraeoides (Nyl.) H. Oliver = *Rinodina mniaraea*
Rinodina mucronatula H. Magn. = *Rinodina terrestris*
Rinodina nimbose (Fr.) Th. Fr. = *Phaeorrhiza nimbose*
Rinodina norrlandica H. Magn. = *Rinodina metaboliza*
Rinodina occidentalis Lynge = *Rinodina calcigena*
Rinodina ocellata (Hoffm.) Arnold = *Rinodina lecanorina*
Rinodina orbata (Ach.) Vain. = *Rinodina turfacea*
Rinodina orculariopsis H. Mayrhofer = *Rinodina sicula*
Rinodina orculata Poelt & M. Steiner = *Rinodina convexula*
Rinodina oreina (Ach.) A. Massal. = *Dimelaena oreina*
Rinodina pallida H. Magn. = *Rinodina gennarii*
Rinodina pannarioides Körb. ex Stein = *Rinodina tephrospis*
Rinodina panschiana Körb. = *Phaeorrhiza nimbose*
Rinodina phaeocarpa Vain. = *Phaeorrhiza nimbose*
Rinodina phaeostigmella H. Magn. = *Rinodina septentrionalis*
Rinodina plana H. Magn. Swedish records = *Rinodina laevigata*
Rinodina plumbella (Nyl.) H. Olivier = *Rinodina atrocinerea*
Rinodina pyreniospora (Nyl.) Branth & Rostr. = *Rinodina conradii*

- Rinodina ramulicola* Kernst. = *Rinodina exigua*
Rinodina rhododendri Hepp ex H. Magn. = *Rinodina malangica*
Rinodina roscida var. *crassa* H. Magn. = *Rinodina roscida*
Rinodina salina Degel. = *Rinodina gennarii*
Rinodina sareptana (Tomin) H. Magn. = *Phaeorrhiza sareptana*
Rinodina sciodes (Nyl.) H. Olivier = *Rinodina luridescens*
Rinodina serpentinei H. Mayrhofer & Poelt = *Rinodina rinodinoides*
Rinodina sophodes var. *genuina* Th. Fr. = *Rinodina sophodes*
Rinodina sophodes var. *cinereovirens* (Vain.) Zahlbr = *Rinodina turfacea* var. *cinereovirens*
Rinodina sophodes var. *lusitanica* H. Magn. = *Rinodina sophodes*
Rinodina sophodes var. *orbicularis* (A. Massal.) H. Olivier = *Rinodina sophodes*
Rinodina soresicola Degel. = *Rinodina olivaceobrunnea*
Rinodina subarenaria A L. Sm. = *Rinodina oxydata*
Rinodina suberumpens (Nyl.) H. Olivier = *Rinodina teichophila*
Rinodina subexigua (Nyl.) H. Olivier = *Rinodina gennarii*
Rinodina subfusca H. Magn. = *Rinodina septentrionalis*
Rinodina subobscura H. Magn. = *Rinodina archaea*
Rinodina subrubescens (Vain.) Zahlbr. = *Rinodina bischoffii*
Rinodina trevisanii (Hepp) Körb. = *Rinodina archaea*
Rinodina trevisanii auct. = *Rinodina convexula*
Rinodina turfacea var. *depauperata* Th. Fr. = *Rinodina turfacea*
Rinodina turfacea var. *fuscogrisea* (Vain.) H. Magn.
Rinodina turfacea var. *microcarpa* (Hepp) Körb. = *Rinodina roscida*
Rinodina turfacea var. *normalis* (Th. Fr.) H. Magn. = *Rinodina turfacea*
Rinodina turfacea var. *nuda* Körb. = *Rinodina mniaraea*
Rinodina turfacea var. *roscida* f. *succedens* (Nyl.) Blomb. & Forsell = *Rinodina turfacea* var. *ecrustacea*
Rinodina tympanelloides Bagl. ex Arnold = *Rinodina atrocinerea*
Rinodina verrucarioides H. Magn. = *Rinodina occulta*

The lichen flora of the Nordic countries has been regarded as one of the best known in the world, containing about 2000 species. The lichenological research of the region has been going on continuously since the days of Erik Acharius (1757-1819), the "father of lichenology". It has, however, been a painful and awkward fact that there is no modern flora treatment of the region, the last attempt being that of Th. M. Fries in the 1870-ies, a work (*Lichenographia scandinavica*) that was left unfinished.

A number of Nordic lichenologists have united forces to produce such a work, and now in the beginning of the new millenium we proudly present the second volume, comprising Physciaceae. This group contains many environmentally important indicator species, which now hopefully will be easier to recognize. We hope to succeed better than Fries, and to produce subsequent volumes with annual or biennial intervals, as the texts become available from the authors.