

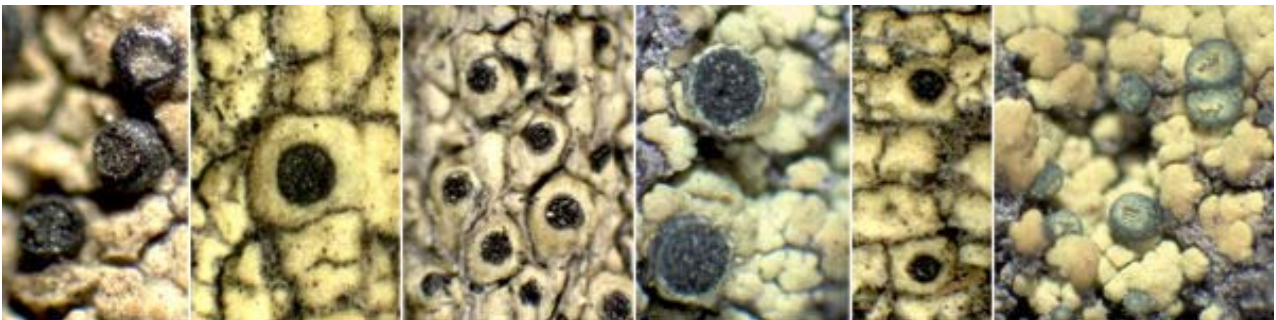


The epiphytic lichens of the Natural Park Paneveggio-Pale di San Martino (E Italian Alps)

(non-annotated, printable version)

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Illustrations of characters by Andrea Moro



KeyToNature - 2010

Since several years the Natural Park of Paneveggio-Pale di San Martino, in the Italian eastern Alps, is promoting research on lichens, which has brought to an inventory of species and to several contributions to the knowledge of their ecology. The Paneveggio Park has an important mission in the conservation of lichens: it hosts almost 650 species, which make up c. 50% of the lichens known from Trentino-Alto Adige, the Italian region with the highest number of known species.

The Park has commissioned to the Department of Life Sciences of the University of Trieste the creation of an interactive guide to all epiphytic lichens hitherto known from the area (currently 242 species), which is freely available on line on the website of the Park and on that of Project Dryades, the Italian branch of the European project KeyToNature (www.dryades.eu, www.keytonature.eu).


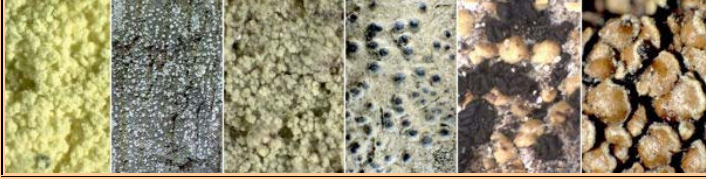






This is a non-annotated, printable version of the on-line key.






The identification of macrolichens can be attempted without the use of the microscope, and is therefore easier. In contrast, that of crustose lichens often requires the observation of microscopical characters. For more details and information, we refer to the on-line version of the key.







Photographs and drawings are largely taken from the archive of ITALIC. The authors are grateful to Andres Saag and Tiina Randlane (University of Tartu, Estonia) and to Harry Taylor (Natural History Museum, London) for further photos and drawings. Thanks are also due to Carlo Morelli for corrections to the original text.


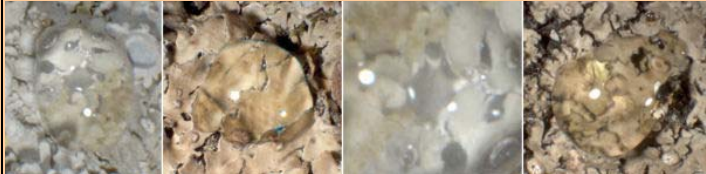
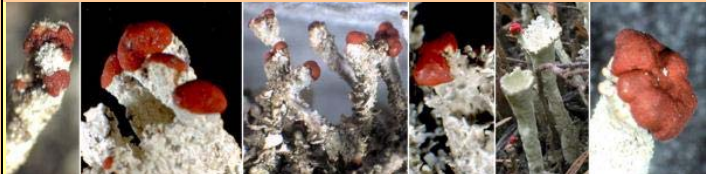



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1	Thallus foliose or fruticose		2
1	Thallus squamulose, leprose or crustose		115
2	Thallus fruticose		3
2	Thallus foliose		43
3	Thallus bright sulphur yellow		Letharia vulpina (L.) Hue
3	Thallus not yellow		4
4	Lichens with a primary thallus of basal squamules and erect structures of various shapes (podetia)		5
4	Lichens not as above, without basal squamules		18
5	Podetia with cups		6
5	Podetia without cups		13








6	Apothecia and pycnidia red (carefully observe the margins of the cups)		7
6	Apothecia and pycnidia brown		9
7	Squamules rounded, to 2 cm wide. Thallus P+ orange, K+ yellow		Cladonia digitata (L.) Hoffm.
7	Squamules elongated, smaller. Thallus P-, K-		8
8	Podetia not strongly fissured, usually with cups. With usnic acid and zeorine		Cladonia deformis (L.) Hoffm.
8	Podetia strongly fissured, rarely with cups. With usnic and squamatic acids		Cladonia sulphurina (Michx.) Fr.
9	Podetia without true soredia		10
9	Podetia uniformly farinose-sorediate		11






10	Thallus not branched, with squamules only at the base of podetia, usually with regular cups, P+ red		Cladonia pyxidata (L.) Hoffm.
10	Thallus branched, uniformly covered by squamules, P-		Cladonia squamosa Hoffm. v. squamosa
11	Cups deformed, gaping at base		Cladonia cenotea (Ach.) Schaer.
11	Cups regular, not gaping at base		12
12	Cups wide and short-stalked. Thallus P-. Apothecia and pycnidia pale yellowish brown		Cladonia carneola (Fr.) Fr.
12	Cups narrow and long-stalked. Thallus P+ red. Apothecia and pycnidia brown		Cladonia fimbriata (L.) Fr.


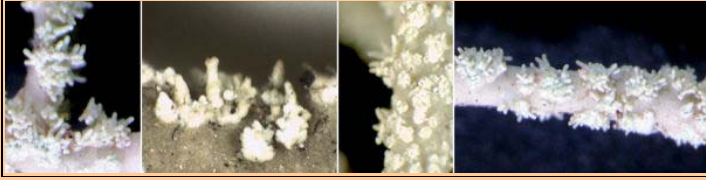

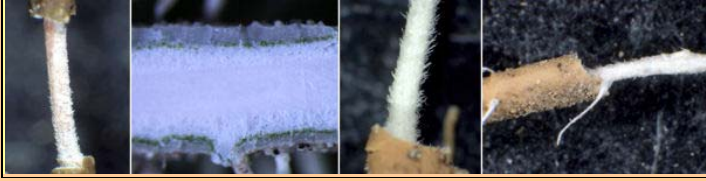


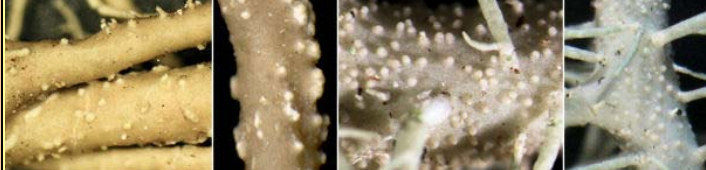
13	Thallus K+ yellow		Cladonia macilenta Hoffm. ssp. macilenta
13	Thallus K-		14
14	Apothecia and pycnidia red		15
14	Apothecia and pycnidia brown		16
15	Without soredia. Thallus KC-		Cladonia macilenta ssp. floerkeana (Fr.) V.Wirth
15	With farinose soredia. Thallus KC+ yellow		Cladonia sulphurina (Michx.) Fr.






16	Podetia without soredia, usually with apothecia		Cladonia botrytes (K.G.Hagen) Willd.
16	Podetia with soredia, often without apothecia		17
17	Podetia P-		Cladonia decorticata (Flörke) Spreng.
17	Podetia P+ red		Cladonia coniocraea (Flörke) Spreng.
18	Lichen brownish or grey when dry		19
18	Lichen greenish when dry		27
19	Thallus thread-like		20
19	Thallus not thread-like		23






20	Thallus K- or K+ brownish		Bryoria fuscescens (Gyeln.) Brodo & D.Hawksw.
20	Thallus K+ yellow		21
21	Thallus, medulla and soredia KC-		Bryoria implexa (Hoffm.) Brodo & D.Hawksw.
21	Thallus, medulla and soredia KC+ pink		22
22	Soralia present. Spinules absent		Bryoria capillaris (Ach.) Brodo & D.Hawksw.
22	Soralia absent. Spinules frequent		Bryoria nadvornikiana (Gyeln.) Brodo & D.Hawksw.



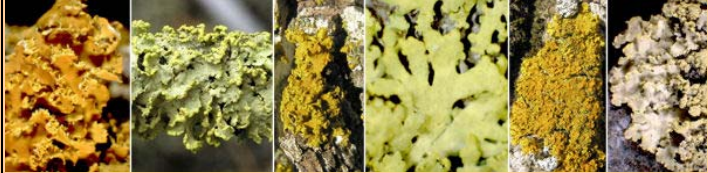
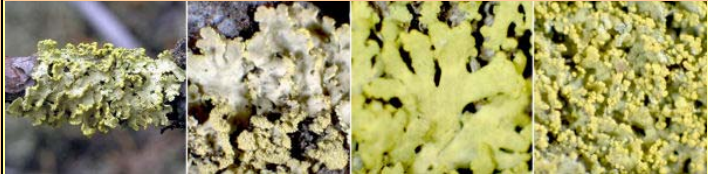



23	With soredia or isidia		24
23	Without soredia or isidia		25
24	Thallus inflated, round in section, with apical soralia		Hypogymnia tubulosa (Schaer.) Hav.
24	Thallus flat, thin, with isidia on upper surface		Pseudevernia furfuracea (L.) Zopf v. furfuracea
25	Without fibrils. Thallus shiny		Cetraria sepincola (Ehrh.) Ach.
25	With long marginal fibrils. Thallus dull		26
26	Lobes usually > 1 mm wide. Apothecial margin smooth. On isolated trees		Anaptychia ciliaris (L.) Korb.
26	Lobes usually < 1 mm wide. Apothecial margin with spinules. Extremely rare, in humid forests		Anaptychia crinalis (Schleich.) Vezda








27	Thallus thread-like, round in section		28
27	Thallus not thread-like		37
28	Without a compact white or pink axial strand visible stretching the thallus		29
28	With a compact, white or pink axial strand visible stretching the thallus		31
29	Thallus angular in section, soft, the medulla cotton-like. Without soredia and pseudocyphellae		Evernia divaricata (L.) Ach.
29	Thallus round in section, the medulla dense. With soredia and/or linear pseudocyphellae		30
30	Thallus without soredia or with tuberculate soralia, with evident linear pseudocyphellae		Alectoria sarmentosa (Ach.) Ach.
30	Thallus with small circular soralia at the end of thin fibrils, without evident pseudocyphellae		Ramalina thrausta (Ach.) Nyl.







31	Apothecia abundant. Isidia and soredia absent		Usnea florida (L.) F.H.Wigg.
31	Apothecia absent or rare. Isidia and/or soredia present		32
32	Medulla and central axis pink		Usnea ceratina Ach.
32	Medulla and central axis white		33
33	Thallus pendulous, much longer than wide		Usnea filipendula Stirt.
33	Thallus shrub-like, not much longer than wide		34
34	Papillae (wart-like outgrowths) absent		35
34	Papillae present, at least on the main branches		36

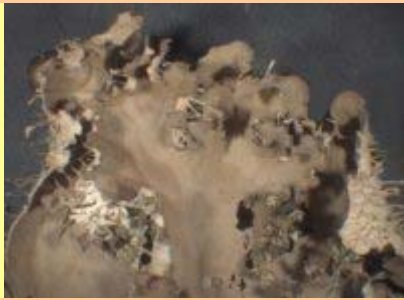






35	Secondary branches restricted at the base. Main branches not delicately pitted. Isidia absent		Usnea glabrata (Ach.) Vain.
35	Secondary branches not restricted at the base. Main branches delicately pitted. Isidia present		Usnea hirta (L.) F.H.Wigg.
36	Isidia usually abundant		Usnea subfloridana Stirt.
36	Isidia absent or developing only on young soredia		Usnea glabrescens (Vain.) Vain.
37	Without soredia		38
37	With soredia		39







38	Thallus soft, pendulous, without apothecia		Evernia divaricata (L.) Ach.
38	Thallus rather rigid, shrub-like, usually with apothecia		Ramalina fastigiata (Pers.) Ach.
39	Thallus bifacial, greenish above, white beneath		Evernia prunastri (L.) Ach.
39	Thallus entirely greenish		40
40	Medulla in part hollow, soralia mainly in the apical parts of lobes		Ramalina obtusata (Arnold) Bitter
40	Medulla not hollow. Soredia or isidia-like granules marginal or on the upper surface		41
41	Thallus not flat, covered by granular soredia		Evernia mesomorpha Nyl.
41	Thallus flat, with farinose soredia		42


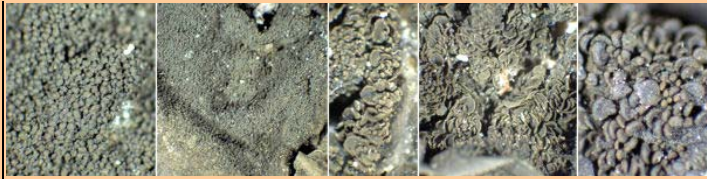
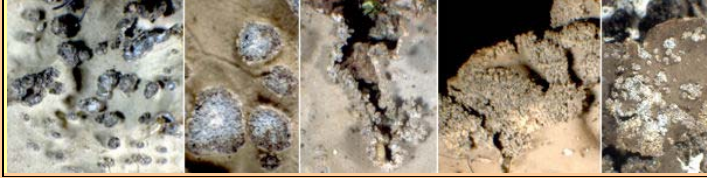



42	Soralia well delimited, marginal		Ramalina farinacea (L.) Ach.
42	Soredia diffuse on the surface of lobes		Ramalina pollinaria (Westr.) Ach.
43	Lichen yellow or orange		44
43	Lichen of another colour		49
44	Thallus lemon-yellow, K-		45
44	Thallus yellow to orange, K+ red		46
45	Lobes < 1 mm wide. On nutrient-rich bark		Candelaria concolor (Dicks.) Stein
45	Lobes > 1 mm wide. On acidic bark		Vulpicida pinastri (Scop.) J.E.Mattsson & M.J.Lai



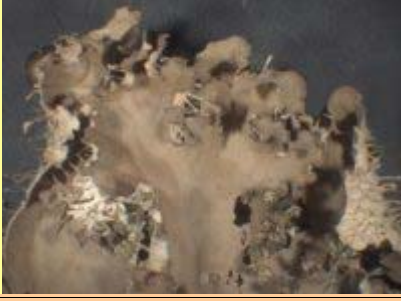
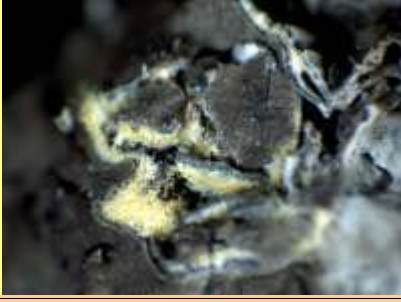


46	Without soredia, usually with apothecia		Xanthoria parietina (L.) Th.Fr.
46	With soredia, apothecia rare		47
47	With circular soralia on the upper surface		Xanthoria fallax (Hepp) Arnold
47	With soralia along the margin or on the tips of lobes		48
48	Soredia (blastidia) on the lower surface of the tips of lobes		Xanthoria fulva (Hoffm.) Poelt & Petutschnig
48	Soredia (blastida) on the marginal parts of the tips of lobes		Xanthoria ulophyllodes Räsänen
49	Without soredia or isidia, usually with apothecia		50
49	With soredia or isidia, apothecia rare		62


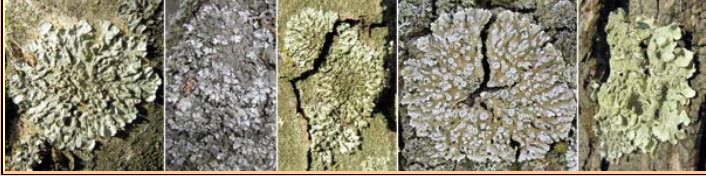



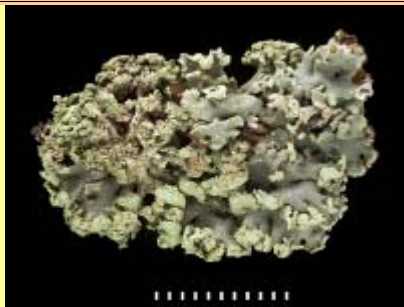
50	Thallus with long marginal cilia		51
50	Thallus without long marginal cilia		52
51	Lobes > 1 mm wide. Apothecial margin smooth. On isolated trees		Anaptychia ciliaris (L.) Körb.
51	Lobes < 1 mm wide. Apothecial margin with spinules. Extremely rare, in humid forests		Anaptychia crinalis (Schleich.) Vězda
52	Lower surface dark. With green algae		55
52	Lower surface pale. With cyanobacteria		53
53	Lobes < 5 mm wide		Pannaria rubiginosa (Ach.) Bory
53	Lobes > 5 mm wide		54
54	Lower surface without veins. Apothecia flat, on the lower surface of lobes		Nephroma bellum (Spreng.) Tuck.






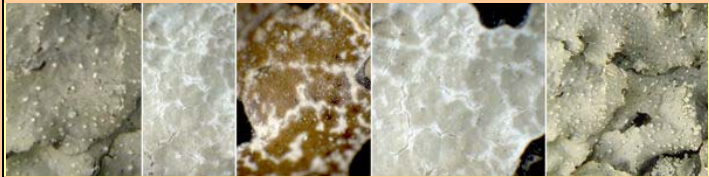
54	Lower surface with a network of pale veins. Apothecia saddle-shaped, on short erect lobes		Peltigera praetextata (Sommerf.) Zopf
55	Upper surface K+ yellow		56
55	Upper surface K-		57
56	Medulla K+ yellow. Upper surface with paler spots		Physcia aipolia (Humb.) Fürnrh.
56	Medulla K-. Upper surface without paler spots		Physcia stellaris (L.) Nyl.
57	Thallus with crowded, short ascending lobes with apical apothecia		Cetraria sepincola (Ehrh.) Ach.
57	Thallus not as above		58
58	Lobes > 5 mm wide. Spores colourless		59



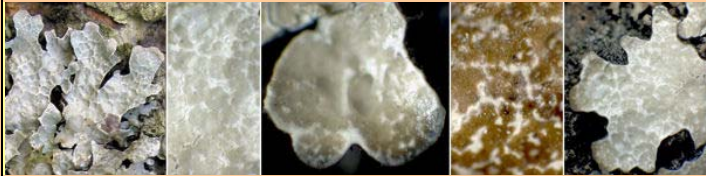

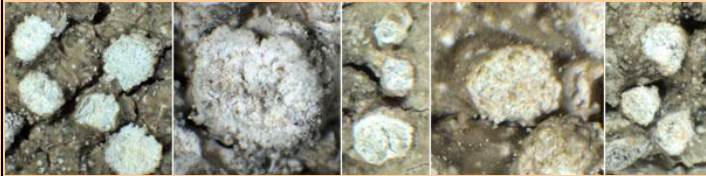

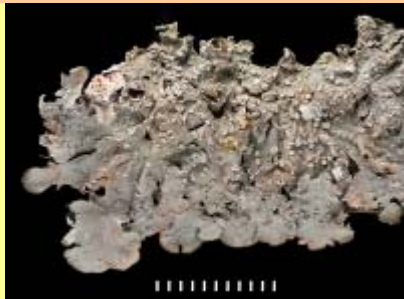
58	Lobes < 5 mm wide. Spores brown		61
59	Medulla C+, KC+ pink. Margin of lobes and apothecia with thin hairs		Melanelixia glabra (Schaer.) O. Blanco, A. Crespo, Divakar, Essl., D. Hawksw. & Lumbsch
59	Medulla C-. Thallus without hairs		60
60	Lobes ascending and concave at margin. Medulla P+ orange		Pleurosticta acetabulum (Neck.) Elix & Lumbsch
60	Lobes firmly attached, the margins not strongly ascending. Medulla P-		Melanohalea exasperata (De Not.) O. Blanco, A. Crespo, Divakar, Essl., D. Hawksw. & Lumbsch
61	Upper surface non-pruinose. Rhizine not branched		Phaeophyscia ciliata (Hoffm.) Moberg




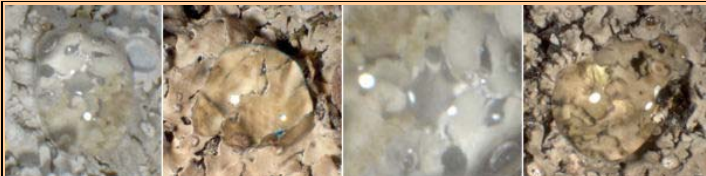

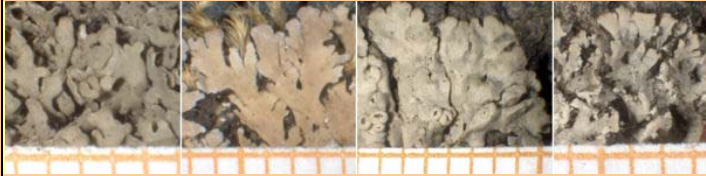

61	Upper surface pruinose, at least on the margins. Rhizines branched		Physconia distorta (With.) J.R.Laundon
62	With cyanobacteria		63
62	With green algae		70
63	Thallus layered, with evident cortex and medulla, not gelatinous when wet		64
63	Thallus not layered, without cortex and medulla, usually gelatinous when wet		69
64	With soredia		65
64	With isidia		67
65	Soralia circular, on the upper surface		Lobarina scrobiculata (Scop.) Nyl.
65	Soralia not well delimited, marginal		66
66	Thallus forming a regular rosette. Lobes < 4 mm wide		Pannaria conoplea (Ach.) Bory



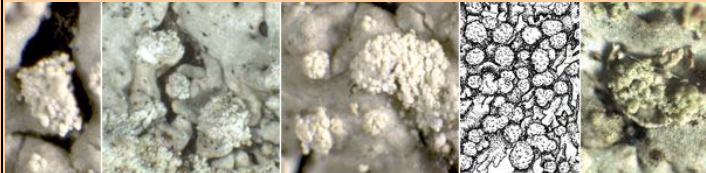
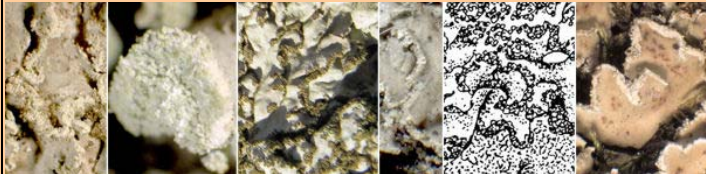

66	Thallus not forming a regular rosette. Lobes > 4 mm wide				Nephroma parile (Ach.) Ach.
67	Lower surface with circular cyphellae				Sticta fuliginosa (Hoffm.) Ach.
67	Lower surface without cyphellae				68
68	Medulla white. Lower surface with pale veins. Isidia mainly along cracks on the upper surface				Peltigera praetextata (Sommerf.) Zopf
68	Medulla yellowish. Lower surface without veins. Isidia not along cracks				Nephroma laevigatum Ach.
69	Lower surface covered by a dense mat of white hairs				Leptogium saturninum (Dicks.) Nyl.
69	Lower surface not covered by white hairs				Collema subflaccidum Degel.






70	Lobes thick, swollen		71
70	Lobes thin, not swollen		77
71	Upper surface with several rounded perforations. Soralia ring-shaped		Menegazzia terebrata (Hoffm.) A.Massal.
71	Upper surface without perforations. Soralia not ring-shaped		72
72	Soredia in well delimited soralia at the tip of lobes		73
72	Soredia at least in part diffuse on the surface of lobes		75
73	Soralia capitate		Hypogymnia tubulosa (Schaer.) Hav.
73	Soralia labriform or irregular		74
74	Medulla P+ red or orange, K+ and KC+ yellow, then brown-red. Very common		Hypogymnia physodes (L.) Nyl.








74	Medulla P-, K- and KC- (but soralia K+, KC+ yellow). Very rare		Hypogymnia vittata (Ach.) Parrique
75	With globose soralia at the tip of short lateral lobes and diffuse soredia on the surface		Hypogymnia bitteri (Lynge) Ahti
75	With diffuse soredia on the surface only		76
76	Thallus at least in part dark brown. Medulla and soralia K+ and KC+ yellow		Hypogymnia austerodes (Nyl.) Räsänen
76	Thallus pale grey. Medulla K-, KC-, soralia K+, KC+ yellow, then red		Hypogymnia farinacea Zopf
77	Upper surface ridged, with distinct depressions, lower surface tomentose with large pale circular areas, without rhizines		Lobaria pulmonaria (L.) Hoffm.
77	Lichens with other features		78
78	With pseudocyphellae on the upper or lower surface of lobes		79
78	Without pseudocyphellae		85

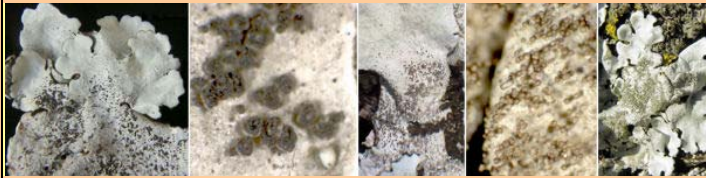





79	Pseudocyphellae on the lower surface of lobes		Tuckneraria laureri (Kremp.) Randlane & Thell
79	Pseudocyphellae on the upper surface of lobes		80
80	Pseudocyphellae circular or dot-like		81
80	Pseudocyphellae linear or forming a network		83
81	Soralia mainly marginal. Upper surface K-		Cetrelia olivetorum (Nyl.) W. L. Culb. & C. F. Culb.
81	Soralia superficial. Upper surface K+ yellow		82
82	Upper surface pruinose (white-frosted). Lower surface black		Punctelia borreri (Sm.) Krog
82	Upper surface non-pruinose. Lower surface pale		Punctelia subrudecta (Nyl.) Krog

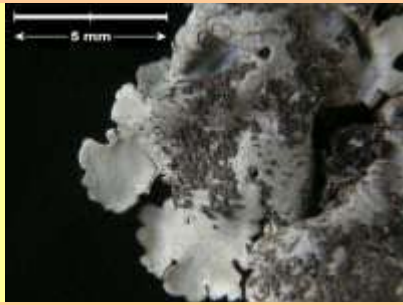



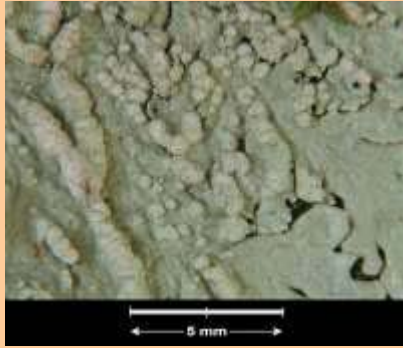
83	Thallus not forming a rosette, with lobes arranged vertically, the tips incurved upwards		<p style="text-align: center;">Parmelia submontana Hale</p>
83	Thallus forming more or less regular rosettes		84
84	With elongate soralia on cracks of the upper surface		<p style="text-align: center;">Parmelia sulcata Taylor</p>
84	With isidia		<p style="text-align: center;">Parmelia saxatilis (L.) Ach.</p>
85	Upper surface K-		86
85	Upper surface K+ yellow (sometimes turning into red)		98
86	Lobes in average < 3 mm wide		87
86	Lobes in average > 3 mm wide		93

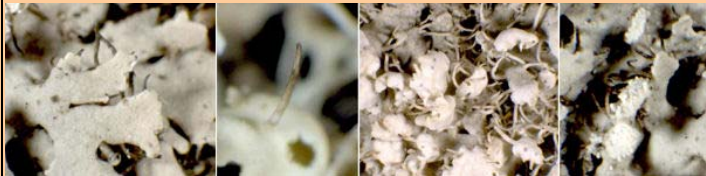

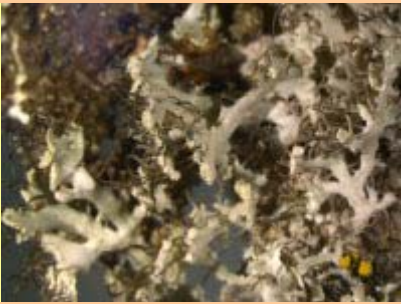



87	Upper surface yellowish-green		<p>Parmeliopsis ambigua (Wulfen) Nyl.</p>
87	Upper surface of another colour		88
88	Lobes ascending, not firmly adpressed on the substrate, breaking easily when dry		<p>Phaeophyscia nigricans (Flörke) Moberg</p>
88	Lobes adpressed on the substrate, not fragile when dry		89
89	Soralia circular at least when young		90
89	Soralia linear or labriiform		91
90	Thallus foliose, with rhizines		<p>Phaeophyscia orbicularis (Neck.) Moberg</p>






90	Thallus subcrustose, firmly attached and apparently almost glued to the substrate, without rhizines		Hyperphyscia adglutinata (Flörke) H.Mayrhofer & Poelt
91	Upper surface with thin transparent hairs (carefully observe the tips of lobes with a stereo-microscope!)		Phaeophyscia hirsuta (Mereschk.) Essl.
91	Upper surface without hairs		92
92	Soralia labriform, at the tip of lobes. Medulla white. Lower surface pale		Phaeophyscia chloantha (Ach.) Moberg
92	Soralia marginal, linear. Medulla yellowish. Lower surface dark		Physconia enteroxantha (Nyl.) Poelt
93	Lobes not firmly attached to the substrate, with marginal soredia. Lower surface with pale rhizines		Tuckermannopsis chlorophylla (Willd.) Hale
93	Lobes firmly attached to the substrate, with isidia or soredia. Lower surface with abundant black rhizines		94






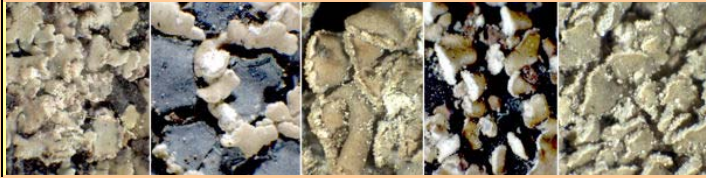

94	Upper surface with thin and short hairs (stereo-microscope!)		Melanelixia subargentifera (Nyl.) O. Blanco, A. Crespo, Divakar, Essl., D. Hawksw. & Lumbsch
94	Upper surface without hairs		95
95	Medulla KC+ pink		96
95	Medulla KC-		97
96	Upper surface shiny at least along the margins. With isidia, without soredia		Melanelixia fuliginosa (Duby) O. Blanco, A. Crespo, Divakar, Essl., D. Hawksw. & Lumbsch
96	Upper surface not shiny. With circular yellowish soralia which can originate isidia when old		Melanelixia subaurifera (Nyl.) O. Blanco, A. Crespo, Divakar, Essl., D. Hawksw. & Lumbsch
97	Without true isidia, but with conical papillae simulating isidia		Melanohalea exasperata (De Not.) O. Blanco, A. Crespo, Divakar, Essl., D. Hawksw. & Lumbsch
97	With true, clavate-spathulate (flattened) isidia		Melanohalea exasperatula (Nyl.) O. Blanco, A. Crespo, Divakar, Essl., D. Hawksw. & Lumbsch

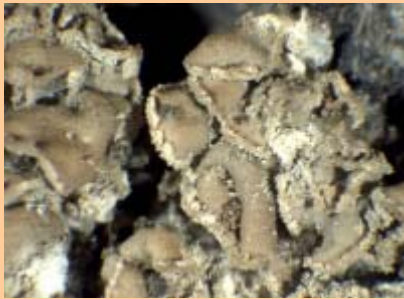
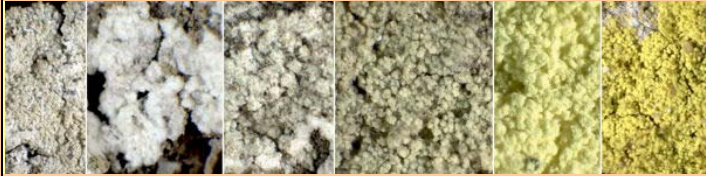
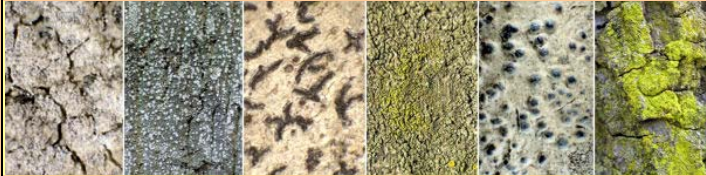



98	With isidia		99
98	With soredia		103
99	Lobes < 4 mm wide		Imshaugia aleurites (Ach.) S L.F.Meyer
99	Lobes > 4 mm wide		100
100	Rhizines lacking. Lobes much longer than wide		Pseudevernia furfuracea (L.) Zopf v. furfuracea
100	Rhizines present at least in the center of the thallus. Lobes usually - but not always! - ca. as long as wide		101
101	With marginal black cilia		Parmotrema crinitum (Ach.) M.Choisy
101	Without marginal black cilia		102
102	Lobes wrinkled, ascending. Medulla KC-		Platismatia glauca (L.) W. L. Culb. & C. F. Culb.

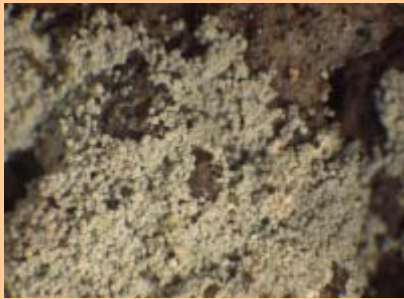





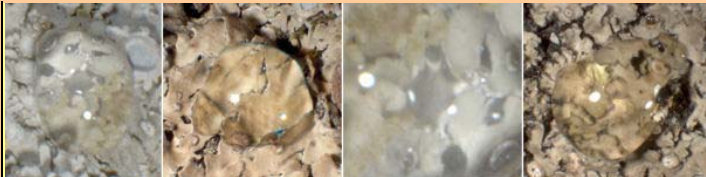
102	Lobes smooth, firmly attached. Medulla KC+ pink		Parmelina pastillifera (Harm.) Hale
103	Thallus yellowish-green when dry		104
103	Thallus grey to brown when dry		106
104	Lobes < 4 mm wide		Parmeliopsis ambigua (Wulfen) Nyl.
104	Lobes > 4 mm wide		105
105	Soredia diffuse. Medulla K- or K+ yellow		Flavoparmelia caperata (L.) Hale
105	Soredia gathered in well delimited, convex, globose soralia. Medulla K+ yellow, then red		Flavoparmelia soredians (Nyl.) Hale
106	Lower surface white to pale brown		107
106	Lower surface dark brown to black		110





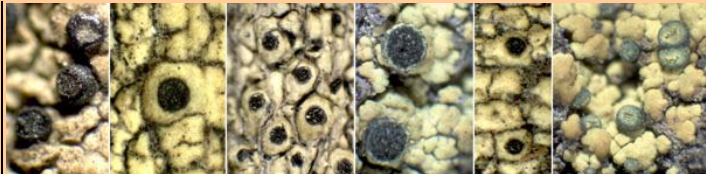

107	Lobes with long marginal cilia		108
107	Lobes without marginal cilia		109
108	Soralia helmet-shaped		Physcia adscendens (Fr.) H.Olivier
108	Soralia labriform (lip-shaped)		Physcia tenella (Scop.) DC.
109	Rhizines simple		Physcia dubia (Hoffm.) Lettau
109	Rhizines branched		Heterodermia speciosa (Wulfen) Trevis.
110	Lobes < 3 mm wide, firmly attached		Parmeliopsis hyperopta (Ach.) Arnold
110	Lobes > 3 mm wide, not firmly attached		111




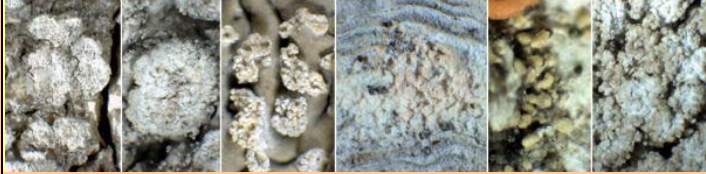
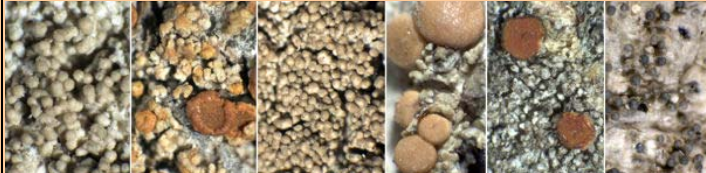
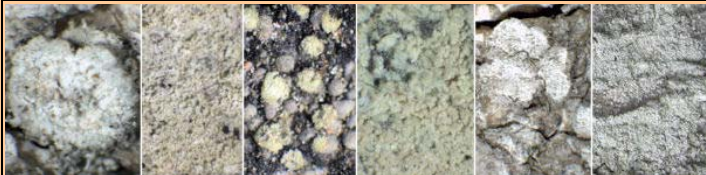

111	Lichen yellowish-green when dry		Allocetraria oakesiana (Tuck.) Randlane & Thell
111	Lichen greyish when dry		112
112	Lobes more or less rounded, concave, without rhizines along the margins for at least 2 mm. Rhizines simple		Parmotrema perlatum (Huds.) M.Choisy
112	Lobes much longer than wide, flat, with abundant rhizines to the margin. Rhizines branched		113
113	Medulla P+ red, C-, K+ yellow then red		Hypotrachyna sinuosa (Sm.) Hale
113	Medulla P-, C+ pink or orange, K-		114
114	Soralia not well delimited. Medulla C+, KC+ pink		Hypotrachyna revoluta (Flörke) Hale
114	Soralia globose, convex, well delimited. Medulla C+, KC+ red-orange		Hypotrachyna laevigata (Sm.) Hale



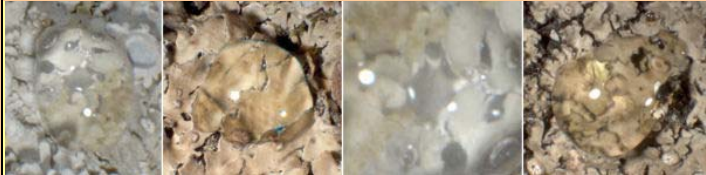
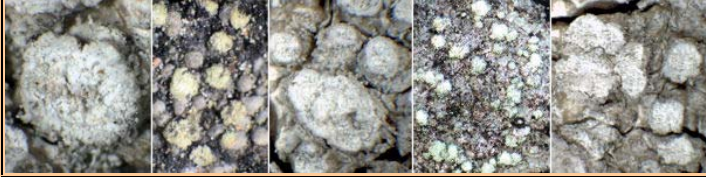



115	Thallus squamulose		116
115	Thallus leprose or crustose		120
116	With cyanobacteria. Lobes thin, papery, strongly eroded at the margins		Leptogium lichenoides (L.) Zahlbr.
116	With green algae		117
117	Squamules ascending, bifacial (grey to green above, white to cream beneath)		Cladonia spp.
117	Squamules adpressed, not clearly bifacial		118
118	Squamules bluish-green		Normandina pulchella (Borrer) Nyl.
118	Squamules dark to pale brown		119
119	Without soredia. Squamules C-		Hypocenomyce friesii (Ach.) P.James & Gotth.Schneid.





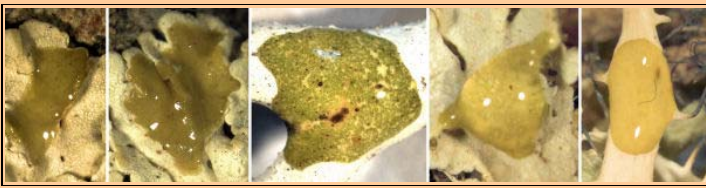

119	With soredia. Squamules C+ red		Hypocenomyce scalaris (Ach.) M.Choisy
120	Thallus leprose (consisting in a soft, powdery mass of soredia-like granules)		121
120	Thallus crustose		124
121	Thallus bright yellow		Chrysothrix candelaris (L.) J.R.Laundon
121	Thallus white, grey or greenish		122
122	Thallus P-, C-, KC-, K-		Lepraria rigidula (de Lesd.) Tønsberg
122	Thallus with at least a positive reaction to P, C, KC, and K		123



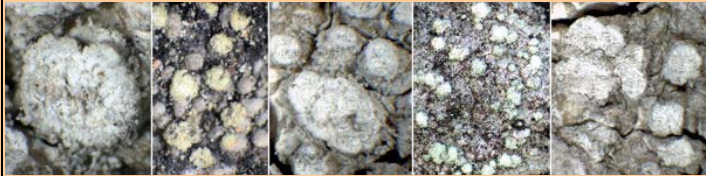




123	Thallus thin, not well delimited. Medulla absent or scarcely developed		Lepraria elobata Tønsberg
123	Thallus thick, well delimited. Medulla thick, conspicuous		Lepraria lobificans Nyl.
124	Thallus bright green, yellow or orange		125
124	Thallus of other colours		132
125	With soredia, usually without apothecia		126
125	Without soredia, often with apothecia		128
126	Soredia K+ red		Caloplaca flavocitrina (Nyl.) H. Olivier
126	Soredia K-		127


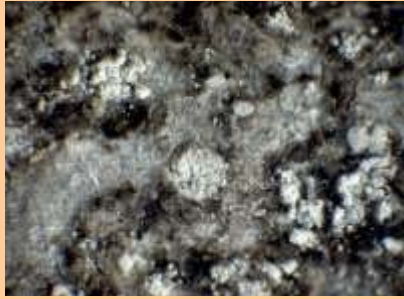




127	Lichen with small soresiate squamules, at least when young. On eutrophic bark		Candelariella reflexa (Nyl.) Lettau
127	Thallus consisting of a continuous mat of soresia, without squamules. On acidic bark		Chrysothrix candelaris (L.) J.R.Laundon
128	Spores coloured, produced continuously by the asci and accumulating on the apothecial disc as a powdery, brown to black mass		129
128	Spores colourless, max 8 per ascus, not accumulating on the apothecial disc		131
129	Apothecia stalked, pin-shaped. Spores 1-celled		Chaenotheca chrysocephala (Ach.) Th.Fr.
129	Apothecia not stalked. Spores > 1-celled		130
130	Apothecia immersed in warts. Spores smooth		Cyphelium tigillare (Ach.) Ach.




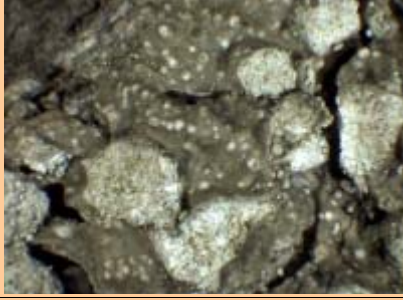

130	Apothecia not immersed in warts. Spores minutely cracked		Cyphelium pinicola Tibell
131	Disc of apothecia brown. Apothecia immersed in warts, at least when young		Pertusaria hymenea (Ach.) Schaer.
131	Disc of apothecia yellow. Apothecia not immersed in warts		Candelariella xanthostigma (Ach.) Lettau
132	With isidia or soredia. Apothecia rare		133
132	Without isidia and soredia. Apothecia frequent		155
133	With isidia		134
133	With soredia		136
134	Isidia black or dark grey, clustered in groups resembling soralia. Medulla J+ blue		Thelomma ocellatum (Körb.) Tibell
134	Isidia not dark-coloured, not clustered in groups resembling soralia. Medulla		135

	J-		
135	Spores 2-celled. Apothecia K+ red		Caloplaca herbidella (Hue) H.Magn.
135	Spores > 4-celled, needle-like. Apothecia and isidia K-		Bacidia rubella (Hoffm.) A.Massal.
136	Thallus or at least soredia K+ yellow or red		137
136	Thallus and soredia K-		143
137	Soralia well delimited, at least when young		138
137	Soredia diffuse on the thallus		141
138	Thallus and soralia K+ yellow, then red		Aplotomma turgida (A.Massal.) A.Massal.
138	Thallus or at least soralia K+yellow to orange		139







139	Thallus immersed in the wood, K-. Soralia K+ first yellow, then orange		Xylographa vitiligo (Ach.) J.R.Laundon
139	Thallus not immersed. With different reactions		140
140	Apothecia frequent, lecanorine. Soralia pale		Pertusaria pupillaris (Nyl.) Th.Fr.
140	Apothecia extremely rare, lecideine. Soralia pale when young, then bluish-green		Mycoblastus fucatus (Stirt.) Zahlbr.
141	Thallus K+ yellow, then red		Phlyctis argena (Spreng.) Flot.
141	Thallus K+ yellow		142
142	Soredia KC+ red		Pycnora sorophora (Vain.) Hafellner






142	Soredia KC-		Loxospora elatina (Ach.) A.Massal.
143	Soredia diffuse on the thallus		144
143	Soralia well delimited at least when young		147
144	Thallus greenish when dry		145
144	Thallus white, grey or pale brown when dry		146
145	Thallus subleprose, diffuse, not well delimited		Chaenotheca furfuracea (L.) Tibell
145	Thallus not subleprose, well delimited		Mycobilimbia epixanthoides (Nyl.) Hafellner & Türk
146	Thallus not well delimited, whitish to pale brown. Apothecia black, lecideine. With pseudoplacodiolic acid		Lecidea leprarioides Tønsb.



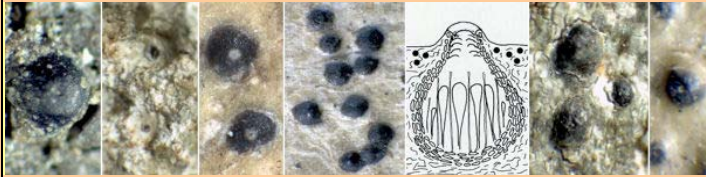


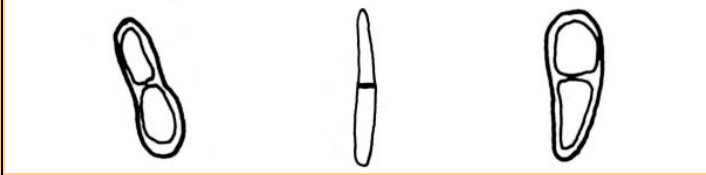

146	Thallus whitish, well delimited, often with a white prothallus. Apothecia lecanorine, extremely rare. With variolaric acid		Ochrolechia microstictoides Räsänen
147	Thallus or soredia P+ red or orange		Biatora efflorescens (Hedl.) Räsänen
147	Thallus and soredia P-		148
148	Thallus or soralia KC+ red or pink		149
148	Thallus and soralia KC- (or KC+ violet)		152
149	Thallus well delimited by a white-silvery prothallus		Pertusaria hemisphaerica (Flörke) Erichsen
149	Without white-silvery prothallus		150
150	Thallus strongly granulo- verrucose. Apothecia frequent, lecanorine		Trapeliopsis granulosa (Hoffm.) Lumbsch
150	Thallus not clearly granulose. Apothecia rare, lecanorine		151



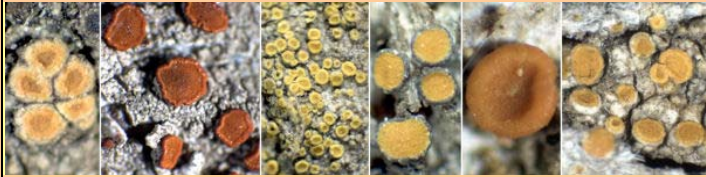


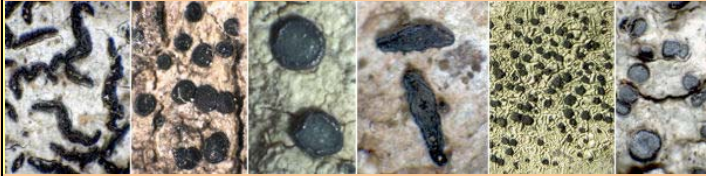

151	Soralia flat or concave, <0.6 mm wide. Thallus UV+ orange		Ochrolechia arborea (Kreyer) Almb.
151	Soralia very convex, usually >0.6 mm wide. Thallus UV-		Ochrolechia androgyna (Hoffm.) Arnold
152	Thallus large and thick, with white spots, zoned or delimited by a paler band		153
152	Thallus small-sized, thin, without white spots and not delimited by a paler band		154
153	Soralia flat to concave, KC-. Lichen without bitter taste (you can taste it: it is not poisonous)		Pertusaria albescens (Huds.) M.Choisy & Werner
153	Soralia convex, KC+ violet. Lichen with a very bitter taste		Pertusaria amara (Ach.) Nyl.
154	Thallus white. Apothecia frequent, lecanorine, the disc KC+ red		Ochrolechia alboflavescens (Wulfen) Zahlbr.



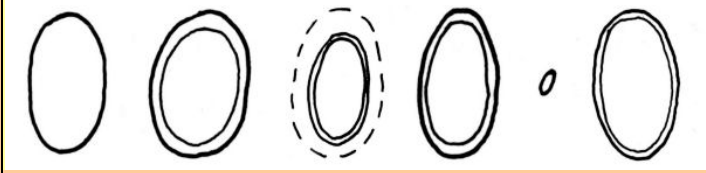
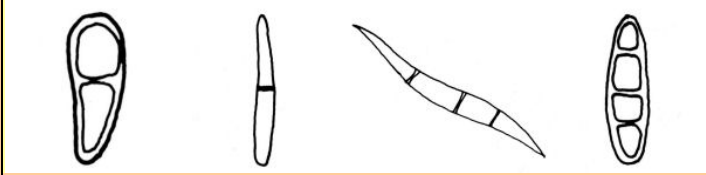



154	Thallus grey to brownish. Apothecia rare, lecideine, the disc KC-		Lecidea pullata (Norman) Th.Fr.
155	With stalked, pin-like apothecia		156
155	With non-stalked apothecia, or with perithecia		168
156	Apothecia covered by a black mass of spores. Spores 2-celled		157
156	Apothecia covered by a brown or greenish mass of spores. Spores 1-celled		161
157	Lower parts of apothecium black, or brown-frosted		158
157	Lower part of apothecium white- or yellow-frosted		159
158	Thallus green, granulose-verrucose		Calicium viride Pers.





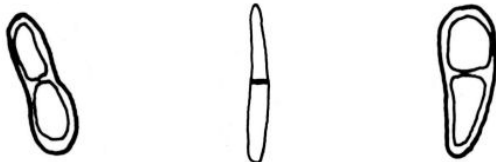
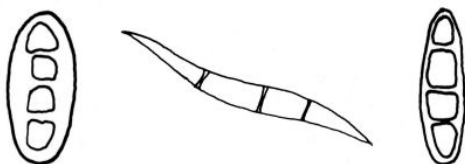
158	Thallus greyish-white or not evident, thin		Calicium abietinum Pers.
159	Lower part of apothecia yellow-frosted		Calicium trabinellum (Ach.) Ach.
159	Lower part of apothecia white-frosted		160
160	Apothecial stalk J- (squash preparation under the microscope!)		Calicium glaucellum Ach.
160	Apothecial stalk J+ blue		Calicium lenticulare Ach.
161	Thallus bright yellow		Chaenotheca chrysocephala (Ach.) Th.Fr.
161	Thallus greenish, greyish or whitish		162

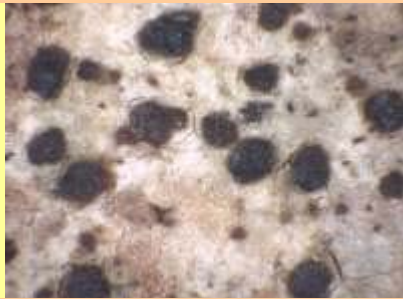

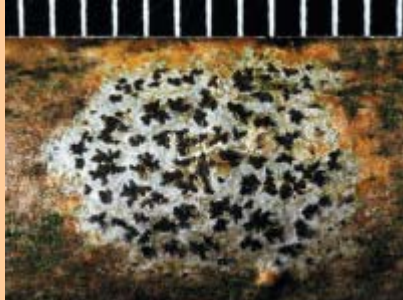
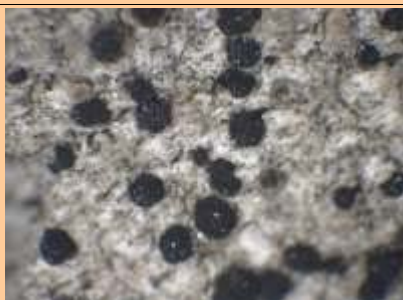
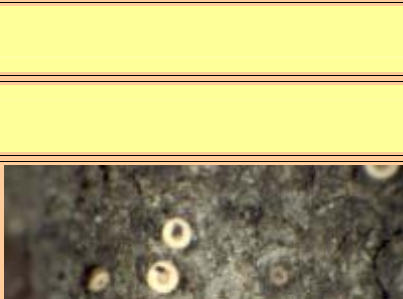
162	Thallus formed by a soft mass of greenish soredia		Chaenotheca furfuracea (L.) Tibell
162	Thallus not as above		163
163	Spores ellipsoidal		Chaenotheca laevigata Nád.v.
163	Spores globose		164
164	With Trentepohlia (algae orange-green)		Chaenotheca hispidula (Ach.) Zahlbr.
164	With chlorococcoid green algae (algae bright green)		165
165	Thallus with orange or rust-coloured, K+ red spots. Algae globose > 10 micron wide		Chaenotheca ferruginea (Sm.) Mig.
165	Thallus without orange spots. Algae elliptical or rectangular < 10 micron wide		166
166	Thallus well-developed, subsquamulose-granulose		Chaenotheca trichialis (Ach.) Th.Fr.
166	Thallus thin, continuous		167


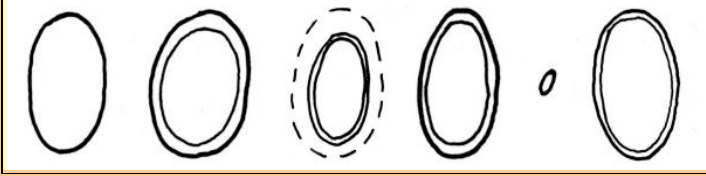



167	Thallus completely immersed in the substrate		Chaenotheca xyloxena Nád.v.
167	Thallus thin, but not completely immersed in the substrate		Chaenotheca gracilentata (Ach.) E.Mattson & Middelborg
168	With perithecia		169
168	With apothecia		172
169	Spores brown		Pyrenula nitida (Weigel) Ach.
169	Spores colourless		170
170	Mainly on Sambucus. Spores pointed at least one end, not arranged in a single row inside the asci		Anisomeridium polypori (Ellis & Everh.) M.E.Barr
170	On other trees. Spores rounded at both ends, arranged in a row inside cylindrical asci		171






171	Perithecia < 0.3-0.5 mm wide. Spores < 16 micron long		Acrocordia cavata (Ach.) R.C.Harris
171	Perithecia 0.5-0.8 mm wide. Spores > 16 micron long		Acrocordia gemmata (Ach.) A.Massal.
172	Disc of apothecia yellow, orange or red, K+ red		173
172	Disc of apothecia of other colours, or if reddish, then K-		174
173	Apothecial margin grey, K-		Caloplaca cerina (Hedw.) Th.Fr. v. cerina
173	Apothecial margin orange, K+ red		Caloplaca ferruginea (Huds.) Th.Fr.
174	Apothecia non lecanorine, the margin without algal cells (usually the disc has the same colour of the margin)		175
174	Apothecia lecanorine, the margin with algal cells (usually the disc differs in colour from the margin)		234







175	Apothecia elongate or star-shaped		176
175	Apothecia ± circular in outline		186
176	Mainly on wood. Spores 1-celled. With chlorococcoid algae. (algal layer bright green)		177
176	Mainly on bark. Spores with at least 2 cells. With Trentepohlia (algal layer orange-green).		178
177	Apothecia 1-2 x c. 0.2 mm, black or brown, the margin thin. Spores 11-17 x 5-7 micron		Xylographa parallela (Ach.: Fr.) Behlen & Desberger
177	Apothecia 0.2-0.3 x c. 0.1 mm, reddish-brown, the margin thick. Spores 10-13 x 4-6 micron		Xylographa trunciseda (Th.Fr.) Redinger
178	Apothecial margin carbonaceous-black when seen in a microscopical section		179
178	Apothecial margin indistinct or transparent		183
179	Spores 4-celled		Opegrapha atra Pers.
179	Spores > 4-celled		180


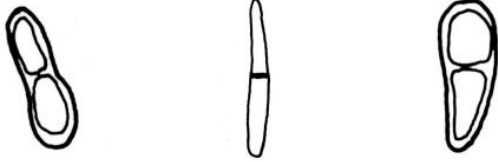


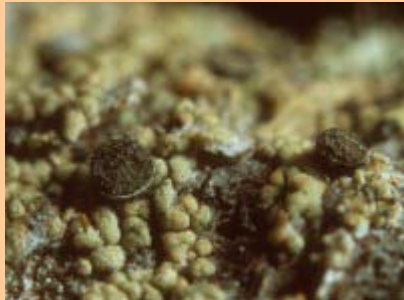

180	Spores J+ violet, thick-walled, with lense-shaped or ovoid cells		Graphis scripta (L.) Ach.
180	Spores J-, thin-walled, with cubical or cylindrical cells		181
181	Spores with the central cell clearly larger than the others		Opegrapha varia Pers.
181	Spores with the central cell not much larger than the others		182
182	Spermatia short, 4-7(-8) x 1-1.3 micron (you have to dissect a pycnidium: the black dots scattered on the thallus)		Opegrapha niveoatra (Borrer) J.R.Laundon
182	Spermatia long, 10-17 x 1-1.5 micron		Opegrapha vulgata Ach.
183	Spores 2-celled. At least the upper part of the hymenium K+ red or violet (microscope!)		184
183	Spores 4-celled. Upper part of the hymenium K- or K+ green		185


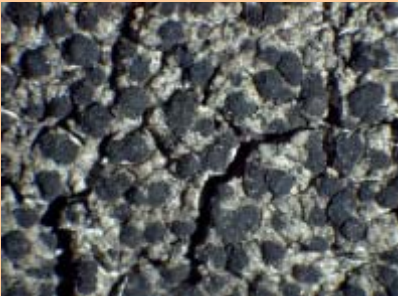




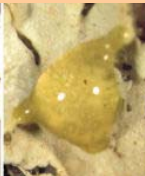


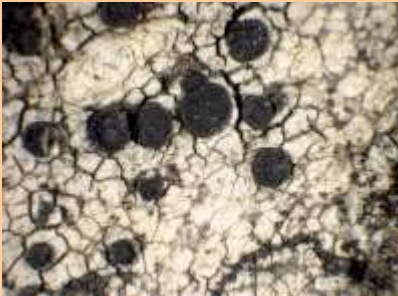
184	Spores 7-10 x 3-4 micron. Hymenium max 45 micron tall. Hypothecium transparent		Arthonia spadicea Leight.
184	Spores 9-15 x 3-6 micron. Hymenium > 50 micron tall. Hypothecium brownish		Arthonia vinosa Leight.
185	Hypothecium colourless or pale brown		Arthonia radiata (Pers.) Ach.
185	Hypothecium dark brown to black		Arthonia mediella Nyl.
186	With Trentepohlia (algal layer orange-green)		187
186	With chlorococcoid algae (algal layer bright green)		188
187	Apothecia pale-coloured. Spores 2-celled		Dimerella pineti (Ach.) Vezda



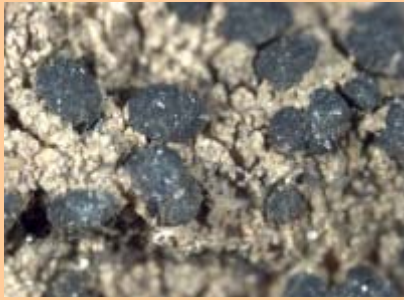


187	Apothecia black. Spores 4-celled		Arthonia mediella Nyl.
188	Spores 1-celled		189
188	Spores with more than 1 cell		204
189	Apothecia pale-coloured		Biatora vernalis (L.) Fr.
189	Apothecia dark brown to black		190
190	Thallus black or dark-brown		191
190	Thallus pale-coloured		193
191	Thallus C+ pink (reaction visible only under a microscope!), formed by elongated granules resembling isidia		Placynthiella icmalea (Ach.) Coppins & P.James
191	Thallus C-, formed by globose granules		192
192	Hypotheceum K-. Apothecia brown when wet, clearly convex and with indistinct margin		Placynthiella uliginosa (Schrad.) Coppins & P.James
192	Hypotheceum K+ red. Apothecia concave to slightly convex, black also when wet, the margin distinct		Placynthiella hyporrhoda (Th. Fr.) Coppins & P.James
193	Spores 1- 2 per ascus		194

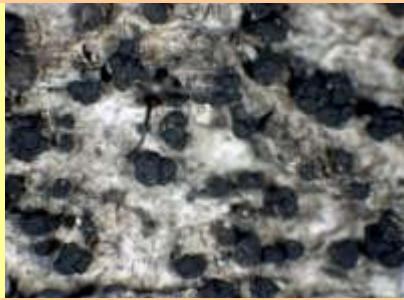

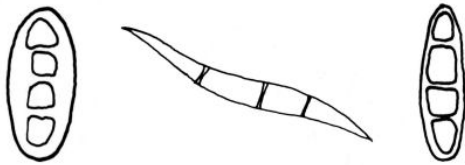




193	Spores at least 8 per ascus		195
194	Spores 2 per ascus. Hypothecium brown		Mycoblastus affinis (Schaer.) T.Schauer
194	Spores 1 per ascus. Hypothecium at least in part blood red		Mycoblastus sanguinarius (L.) Norman
195	Spores > 32 per ascus		196
195	Spores 8 per ascus		197
196	Apothecial margin well developed (section under the microscope!). Epihymenium N-. Pycnidia sessile or stalked. Spermatia globose < 1.5-2 micron wide		Strangospora deplanata (Almq.) Clauzade & Cl.Roux
196	Apothecial margin extremely thin or absent. Epihymenium N+ reddish. Pycnidia immersed. Spermatia 2.5-4 x 1-1.5 micron		Strangospora moriformis (Ach.) Stein
197	Epihymenium blue to bluish green		198
197	Epihymenium brown to colourless		200
198	Mainly on bark. Spores 6-9 micron wide. Thallus KC+ orange		Lecidella elaeochroma (Ach.) M.Choisy
198	Mainly on wood. Spores < 6 micron wide. Thallus KC-		199

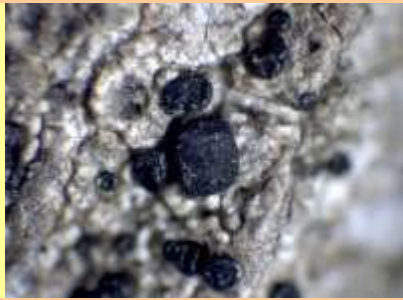


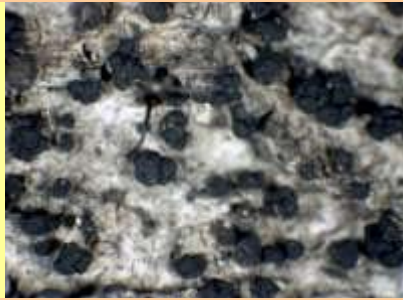

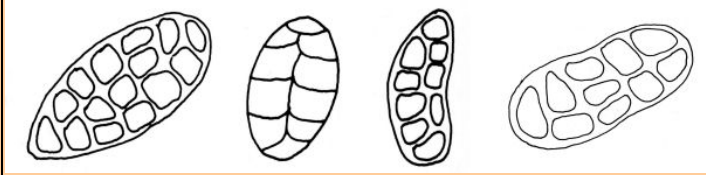

199	Apothecia 0.2-0.5 mm, pruinose, with an indistinct margin even when young. Spores 6-12 x 2-4 micron		Biatora ocelliformis (Nyl.) Arnold
199	Apothecia 0.4-0.8 mm, non pruinose, the margin distinct. Spores 9-12 x 4-6 micron		Lecidea xylophila Th.Fr.
200	Thallus K+ red		Lecanora cadubriae (A.Massal.) Hedl.
200	Thallus K-		201
201	Thallus P+ red		Biatora ocelliformis (Nyl.) Arnold
201	Thallus P-		202
202	Hypothecium pale-coloured		Biatora helvola Hellb.
202	Hypothecium dark brown to black		203
203	Thallus well-developed, granulose-verrucose. Apothecia 0.3-0.6 mm		Lecidea albofuscescens Nyl.



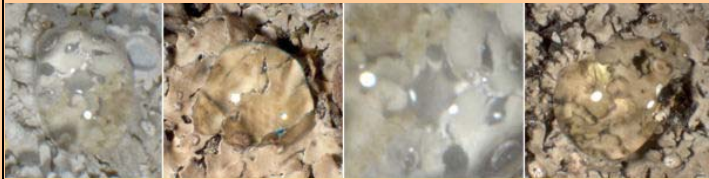



203	Thallus poorly developed, thin. Apothecia 0.5-1.5 mm		Mycobilimbia hypnorum (Lib.) Kalb & Hafellner
204	Spores 2-celled		205
204	Spores > 2-celled		217
205	Spores pigmented		206
205	Spores colourless		212
206	Spores produced continuously by the asci and accumulating on the apothecial disc as a powdery, brown to black mass		207
206	Spores not accumulating on the apothecial disc		208
207	Apothecia 1.5-2.5 mm wide		Cyphelium inquinans (Sm.) Trevis.
207	Apothecia 0.4-0.7 mm wide		Cyphelium karelicum (Vain.) Räsänen
208	Thallus K-		209
208	Thallus K+ yellow or red		210


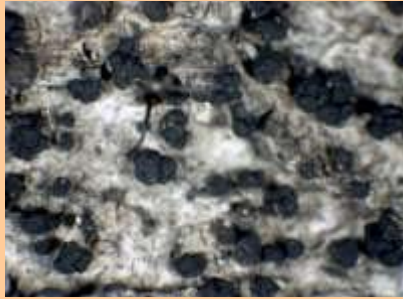
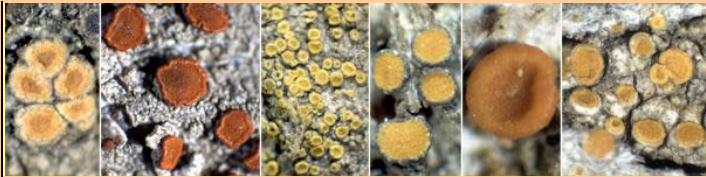




209	Thallus very thin or not evident. Spores 7-10 x 3-4 micron, pale brown				Buellia schaereri De Not.		
209	Thallus well developed. Spores > 10 micron long and > 4 micron wide, dark brown				Amandinea punctata (Hoffm.) Coppins & Scheid.		
210	Thallus K+ yellow, then blood-red				Buellia erubescens Arnold		
210	Thallus K+ persistently yellow or brownish yellow						211
211	Apothecial margin (section under the microscope) K+ yellow. Thallus KC+ yellow-orange				Tetramelas chloroleucus (Körb) A.Nordin		
211	Apothecial margin K-. Thallus KC-				Buellia disciformis (Fr.) Mudd		

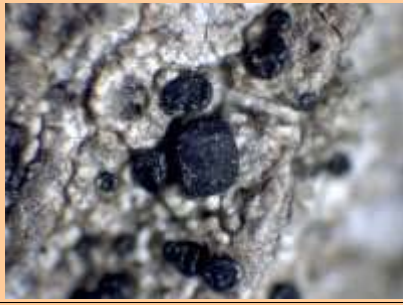
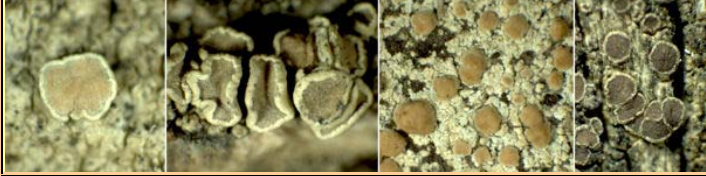
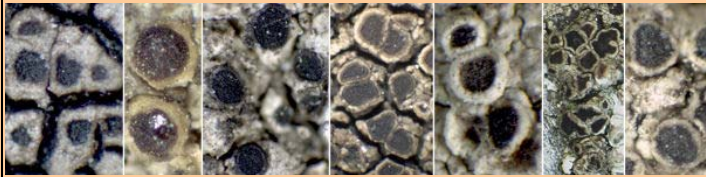
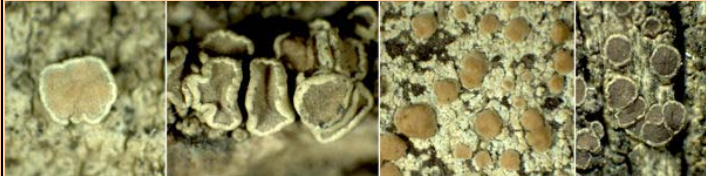



212	Apothecia pale-coloured		Micarea prasina Fr.
212	Apothecia black to dark-brown		213
213	Apothecia (at least when young) with a flat disc and an evident margin. Apothecial margin formed by hyphae which are coherent in K		Catillaria erysiboides (Nyl.) Th.Fr.
213	Apothecia since the beginning convex and without margin. Apothecial margin (when visible in a section under the microscope) formed by hyphae which are not coherent in K		214
214	Thallus C+ pink (ephemeral reaction, to be observed on a squash preparation under the microscope)		Micarea denigrata (Fr.) Hedl.
214	Thallus C-		215
215	Epihymenium K- or K+ green		Lecania hyalina (Fr.) R.Sant.
215	Epihymenium K+ violet		216







216	Apothecia (in section: microscope!) C+ pink		Micarea nitschkeana (Rabenh.) Harm.
216	Apothecia C-		Micarea prasina Fr.
217	Spores 4-celled		218
217	Spores > 4-celled		223
218	Apothecia pale-coloured		219
218	Apothecia black or dark-brown		220
219	Thallus C-, KC-. Young apothecia with an obvious raised margin		Mycobilimbia pilularis (Körb.) Hafellner & Türk
219	Thallus C+, KC+ pink. Apothecia soon convex and without margin		Micarea peliocarpa (Anzi) Coppins & R.Sant.
220	Apothecia soon convex and without margin. Paraphyses richly branched and anastomosing		221


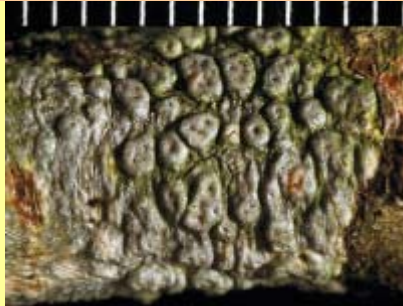





220	Disc of apothecia flat, the margin evident, at least in young apothecia. Paraphyses poorly branched and not anastomosing		Bacidia beckhausii Körb.
221	Thallus C+, KC+ pink (squash preparation under the microscope!)		Micarea peliocarpa (Anzi) Coppins & R.Sant.
221	Thallus C-, KC-		222
222	Hypothecium colourless		Micarea nitschkeana (Rabenh.) Harm.
222	Hypothecium dark-coloured		Micarea melaena (Nyl.) Hedl.
223	Spores muriform or submuriform (with both longitudinal and transversal septa)		224
223	Spores with transversal septa only		225
224	Apothecia pruinose (white-frosted). Spores brown, 8 per ascus		Diplotomma alboatrum (Hoffm.) Flot.


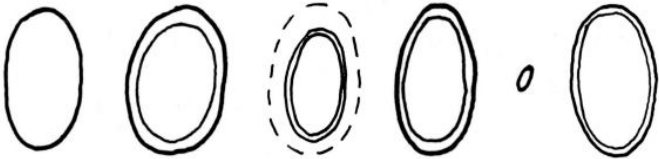




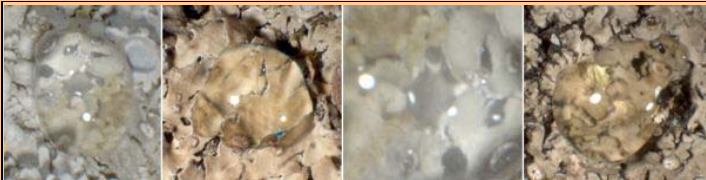
224	Apothecia not pruinose. Spores colourless, 1 per ascus		Lopadium disciforme (Flot.) Kullh.
225	Apothecia soon convex and with indistinct margin		226
225	Apothecia with an obvious margin and a flat disc at least when young		230
226	Spores sigmoid (S-shaped)		Scoliciosporum umbrinum (Ach.) Arnold
226	Spores not sigmoid		227
227	Thallus C- (squash preparation under the microscope!)		228
227	Thallus C+ pink		229
228	Thallus P+ red. Mainly on wood		Micarea lignaria (Ach.) Hedl. v. lignaria
228	Thallus P-. Mainly on bark		Scoliciosporum chlorococcum (Stenh.) Vezda




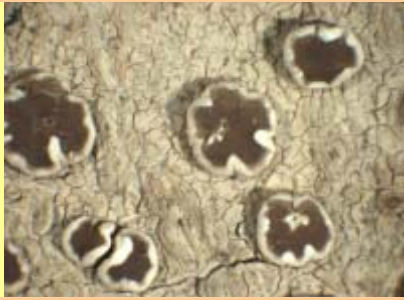

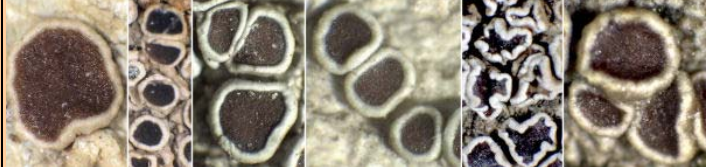
229	Upper part of the hymenium K-		Micarea cinerea (Schaer.) Hedl.
229	Upper part of the hymenium K+ violet		Micarea nitschkeana (Rabenh.) Harm.
230	Apothecia pale-coloured (yellowish, pink, reddish)		231
230	Apothecia dark brown to black		232
231	Apothecia > 0.7 mm wide, the disc flat, the margin obvious, raised		Bacidia rubella (Hoffm.) A.Massal.
231	Apothecia < 0.7 mm wide, the disc soon convex, the margin indistinct		Bacidina phacodes (Körb.) Vezda
232	Hypothecium dark brown		Bacidia subincompta (Nyl.) Arnold
232	Hypothecium colourless to pale brown		233



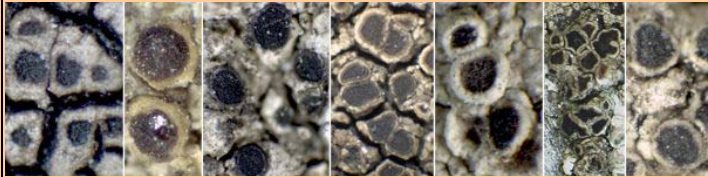
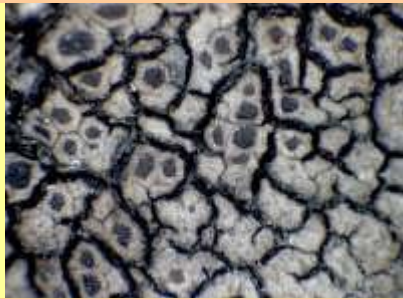


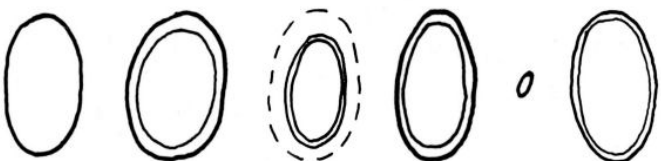
233	Spores not needle-like, < 40 micron long		Bacidia beckhausii Körb.
233	Spores needle-like, > 40 micron long		Bacidia polychroa (Th.Fr.) Körb.
234	Thallus greenish also when dry		235
234	Thallus not greenish		239
235	Disc of apothecia soon dark brown or black		236
235	Disc of apothecia pale-coloured (green to pale brown)		237
236	Disc of apothecia flat, with an obvious margin		Lecanora mughicola Nyl.
236	Disc of apothecia soon convex, the margin absent or inconspicuous		Lecanora sarcopidoides (A.Massal.) A.L.Sm.
237	Apothecia soon convex and with indistinct margin. Thallus C-, KC-		Lecanora symmicta (Ach.) Ach.
237	Apothecia flat, with a distinct, raised margin.		238






	Thallus C+, KC+ yellow		
238	Apothecial margin P+ red-orange		Lecanora varia (Hoffm.) Ach.
238	Apothecial margin P-		Lecanora saligna (Schrad.) Zahlbr.
239	Apothecia immersed in warts, at least when young		240
239	Apothecia not immersed in warts		243
240	Thallus KC- or KC+ pale yellow		241
240	Thallus KC+ orange		Pertusaria hymenea (Ach.) Schaer.
241	Disc of apothecia flat. Spores 2-4-celled, < 20 micron long. Thallus P-		Anzina carneonivea (Anzi) Scheid. v. carneonivea
241	Disc of apothecia punctiform (dot-like). Spores 1-celled, > 20 micron long. Thallus P+ red		242




242	Warts conical, larger at the base, usually with a single apothecium. Spores 4 per ascus		Pertusaria leioplaca DC.
242	Warts constricted at base, with 2-many apothecia. Spores 2 per ascus		Pertusaria pertusa (Weigel) Tuck.
243	Thallus K+ yellow or red		244
243	Thallus K-		255
244	Disc of apothecia C+ intensely lemon-yellow		245
244	Disc of apothecia C- or C+ pink		246
245	Apothecial margin P-		Lecanora carpinea (L.) Vain.
245	Apothecial margin P+ yellow-orange		Lecanora leptyrodos (Nyl.) Degel.

246	Spores 2-celled, pigmented		247
246	Spores 1-celled, colourless		248
247	Apothecial cortex > 50 micron wide, J+ blue. Spores > 18 micron long		Rinodina capensis Hampe
247	Apothecial cortex < 20 micron wide, J-. Spores 13-18 micron long		Rinodina exigua (Ach.) Gray
248	Thallus K+ yellow, then blood-red		Lecanora cadubriae (A.Massal.) Hedl.
248	Thallus K+ persistently yellow		249
249	Thallus and apothecia P-		250
249	Thallus or at least apothecial margin or disc P+ yellow, orange or red		251

250	Disc of apothecia pale brown		Lecanora chlarotera Nyl.
250	Disc of apothecia dark brown		Lecanora argentata (Ach.) Malme
251	Disc of apothecia P+ red		Lecanora albella (Pers.) Ach.
251	Disc of apothecia P-		252
252	Apothecial margin P+ orange. Apothecia usually > 1 mm wide, the disc pale, the margin often wavy		Lecanora intumescens (Rebent.) Rabenh.
252	Apothecial margin P+ yellow or red, or P-. Apothecia usually a 1 mm wide, the disc dark-coloured, the margin not wavy		253
253	Disc of apothecia pale brown		Lecanora salicicola H.Magn.
253	Disc of apothecia dark brown		254

254	Apothecial margin P- or P+ pale yellow		Lecanora circumborealis Brodo & Vitik.
254	Apothecial margin P+ red		Lecanora pulicaris (Pers.) Ach.
255	Disc of apothecia dark, usually black. Spores pigmented		256
255	Disc of apothecia not black. Spores colourless		257
256	Thallus areolate, apothecia immersed in the thallus		Rinodina sophodes (Ach.) A.Massal.
256	Thallus thin, not areolate. Apothecia not immersed in the thallus		Rinodina pyrina (Ach.) Arnold
257	Spores 2-celled		Lecania cyrtella (Ach.) Th.Fr.
257	Spores 1-celled		258

258	Thallus brown, well-developed		259
258	Thallus pale-coloured or not well-developed		260
259	On wood. Apothecial margin distinct and persistent		Protoparmelia oleaginea (Harm.) Coppins
259	On bark. Apothecial margin indistinct, visible only in section under a microscope		Protoparmelia ochrococca (Nyl.) M.Jørg., Rambold & Hertel
260	Apothecia > 4 mm wide with a smooth and prominent margin		261
260	Apothecia smaller		262
261	Disc of apothecia KC+ pink		Ochrolechia pallescens (L.) A.Massal.
261	Disc of apothecia KC-		Ochrolechia szatalaensis Verseghy
262	Spores > 20 micron long		Pertusaria carneopallida (Nyl.) Anzi
262	Spores < 20 micron long		263

263	Disc of apothecia white-frosted (at least in young apothecia)				Lecanora hagenii (Ach.) Ach.
263	Disc of apothecia not white-frosted				264
264	Disc of apothecia black, at least when old. Mainly on wood				Lecanora hypoptoides (Nyl.) Nyl.
264	Disc of apothecia brown even when old. Mainly on bark				Lecanora umbrina (Ach.) A.Massal.