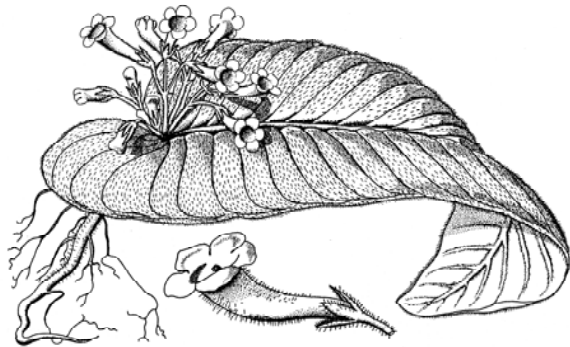


FRITSCHIANA

52



Veröffentlichungen aus dem
Institut für Pflanzenwissenschaften
der Karl-Franzens-Universität Graz

Walter OBERMAYER

Lichenotheca Graecensis, Fasc. 15 (Nos 281–300)

Dupla Graecensia Lichenum (2006, nos 401–480)

Josef HAFELLNER

**Lecideoid lecanoralean ascomycetes invading *Rhizocarpon*
subgen. *Rhizocarpon* taxa, with special emphasis on
cryptothalline species**

Graz, 31. Jänner 2006

Hofrat Prof. Dr. Karl FRITSCH

(* 24.2.1864 in Wien, † 17.1.1934 in Graz)

Karl FRITSCH studierte nach einem Jahr in Innsbruck an der Universität Wien Botanik und wurde dort 1886 zum Dr.phil. promoviert; 1890 habilitierte er sich. Nach Anstellungen in Wien wurde FRITSCH 1900 als Professor für Systematische Botanik an die Universität Graz berufen, wo er aus bescheidenen Anfängen ein Institut aufbaute. 1910 wurde er Direktor des Botanischen Gartens, 1916 wurde das neu errichtete Institutsgebäude bezogen. Aus der sehr breiten wissenschaftlichen Tätigkeit sind vor allem drei Schwerpunkte hervorzuheben: Floristisch-systematische Studien, besonders zur Flora von Österreich, monographische Arbeiten (besonders über *Gesneriaceae*) und Arbeiten zur systematischen Stellung und Gliederung der Monocotylen. An Kryptogamen interessierten ihn besonders Pilze und Myxomyceten.

Nachrufe: KNOLL F. 1934, Ber. Deutsch. Bot. Ges. 51: (157)–(184) (mit Schriftenverzeichnis). - KUBART B. 1935, Mitt. Naturwiss. Ver. Steiermark 71: 5–15 (mit Porträt). - TEPPNER H. 1997, Mitt. Geol. Paläont. Landesmus. Joanneum (Graz) 55: 133–136. - Im übrigen vgl. STAFLEU F.A. & COWAN R.S. 1976, Tax. Lit. 1: 892 und BARNHART J.H. 1965, Biogr. Notes Botanists 2: 12.

Graz, November 1997

H. TEPPNER

Die Serie FRITSCHIANA wurde als Publikationsorgan für die zahlreichen Aktivitäten im Zusammenhang mit der botanischen Sammlung des Institutes für Pflanzenwissenschaften, Bereich Systematische Botanik und Geobotanik (vormals Institut für Botanik), der Karl-Franzens-Universität Graz (GZU) gegründet. Vor allem Schedae-Hefte der von den Mitarbeitern herausgegebenen Exsiccatenwerke sollten hier erscheinen, aber auch Exkursionsberichte sowie Listen und Indices besonders wertvoller Bestände in GZU. Das Spektrum wurde mittlerweile auf floristische und kleinere taxonomische Arbeiten sowie das Samentauschverzeichnis des Botanischen Gartens ausgeweitet. Die Schedae-Hefte des von Prof. Dr. Josef POELT begründeten, inzwischen abgeschlossenen Exsiccatenwerkes *Plantae Graecenses* sind die Vorläufer dieser Schriftenreihe.

Gesamtredaktion:

Dr. Christian SCHEUER, Mag. Dr. Walter OBERMAYER
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Bereich Systematische Botanik und Geobotanik, Holteigasse 6
A-8010 Graz, Österreich/Austria

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Umschlagsbild: *Carolofritschia diandra* ENGL. (= *Acanthonema strigosum* HOOK.f.); nach einer Zeichnung in HUTCHINSON, J. & HEPPER, F.N. 1963, Flora of West Tropical Africa, Ed. 2, Vol. II: 382.

FRITSCHIANA

Veröffentlichungen aus dem
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Graz, 31. Jänner 2006

Lichenotheca Graecensis, Fasc. 15 (Nos 281–300)

Walter OBERMAYER*

OBERMAYER W. 2006: Lichenotheca Graecensis, Fasc. 15 (Nos 281–300). - Fritschiana (Graz) 52: 1–6. - ISSN 1024-0306.

Abstract: Fascicle 15 of Lichenotheca Graecensis comprises 20 collections of lichens from the following countries (and administrative subdivisions): Austria (Carinthia; Salzburg; Tirol; Styria; Upper Austria), China (Tibet, prov. Xizang), Germany (Bavaria), Italy (Calabria), Mexico (Baja California Sur), Russia (Murmansk Region) Slovenia, and Uruguay (Montevideo). Fertile material of *Cetraria islandica* (Austria) and sorediate specimens of *Flavocetraria nivalis* (Russia) are included. TLC-analyses were carried out for the sorediate-isidiate *Lobaria 'parapulmonaria'* ined. (Tibet), obviously a close relative of *L. pulmonaria* but containing cyanobacteria as the major photobiont. The former species is issued as a result of the 'Sino-German Joint Expedition to Southeastern and Eastern Tibet 1994'.

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The exsiccata series 'Lichenotheca Graecensis' is distributed on exchange basis to the following 20 herbaria and private collections (herbarium abbreviations follow <http://sciweb.nybg.org/science2/IndexHerbariorum.asp>): ASU, B, C, CANB, CANL, E, G, GZU, H, HAL, HMAS, LE, M, MAF, MIN, O, TNS, UPS, Dr. Klaus Kalb, Dr. Antonin Vězda. Abbreviations of authors of plant names are taken from http://www.huh.harvard.edu/databases/cms/botanist_index.html. Names of countries and states (or provinces or principal subdivisions) are based upon a list from <http://www.ars-grin.gov/cgi-bin/npgs/html/geolist.pl>. A text version of 'Lichenotheca Graecensis' can be found under <http://www.uni-graz.at/walter.obermayer/li-grz1.htm>. Label texts originally drafted in a local language have been translated into English by the author.

I wish to thank all lichenologists who have made their lichen material available, particularly Josef Hafellner, Helmut Mayrhofer, Hector S. Osorio, Domenico Puntillo, Roman Türk, and Mikhail Zhurbenko.

The expedition of the author to southeastern Tibet in 1994 was supported by the Austrian Science Fund (project number P09663-BIO).

OBERMAYER W. 2006: **Lichenotheca Graecensis**, Fasc. 15 (Nos 281–300). - Fritschiana 52: 1–6. Distributed by the *Institut für Pflanzenwissenschaften, Karl-Franzens-Universität, Graz (GZU)*

281. *Acrocordia gemmata* (Ach.) A.Massal.

AUSTRIA, Steiermark (= Styria), Weststeirisches Hügelland, surrounding area of Jöbß, 5 km S of Wildon, at the castle 'Schloß Eybesfeld', 46°50'45"N / 015°31'00"E, MTB 9159/3, 300 m alt., scruffy park, on bark of *Fraxinus excelsior*.

15.VI.2003

leg. & det. J. Hafellner (60731)

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282. *Bacidia rubella* (Hoffm.) A.Massal.

AUSTRIA, Oberösterreich (= Upper Austria), 2.6 km NW of Alkoven, valley of the rivulet 'Innbach', Aham, 48°18'06"N / 014°04'46"E, MTB 7650, 260 m alt., on *Malus domestica*.

2.XI.1998

leg. & det. R. Türk (26292) & E. Schininger

OBERMAYER W. 2006: **Lichenotheca Graecensis**, Fasc. 15 (Nos 281–300). - Fritschiana 52: 1–6. Distributed by the *Institut für Pflanzenwissenschaften, Karl-Franzens-Universität, Graz (GZU)*

283. *Buellia lauricassiae* (Fée) Müll.Arg.

MEXICO, Baja California Sur, coastal plain just NE of Puerto Cancún, about 0.5 km behind the coast, 24°33'N / 111°45'W, 5 m alt., desert scrub, on spines of *Machaerocereus gummosus*.

Note: The species belongs to the *Buellia disciformis* (*Hafellia d.*) group representing an additional evolutionary lineage towards muriform ascospores in *Buellia* coll. (annot. J. Hafellner).

18.II.1993

leg. & det. J. Hafellner (64096)

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284. *Calicium glaucellum* Ach.

SLOVENIA, Paški Kozjak, NE of Velenje, near the church "St.Jošt", 46°23'N / 015° 11'E, 1070 m alt., on *Pyrus communis*.

Note: Specimen in GZU with intermixed *Calicium salicinum*.

02.VII.2002

leg. & det. H. Mayrhofer (15958)

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285. *Candelariella kuusamoensis* Räsänen

ITALY, Calabria, Reggio di Calabria, Aspromonte, Pietra Impiccata, 1680 m alt., on bark of a deciduous tree.

20.VI.1989 leg. D. Puntillo (s.n.) (), det. W. Obermayer (2004)

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286. *Cetraria islandica* (L.) Ach.

[all issued specimens with apothecia !]

AUSTRIA, Steiermark (= Styria), Steirisches Randgebirge, Stubalpe, Steinplan 8 km SE of Knittelfeld, summit area just N below the cross on the summit, 47°09'50"N / 014°54'15"E, MTB 8855/1, 1660 m alt., clearances in subalpine *Picea abies* forest with low outcrops of mica slate, on thick cover of bryophytes on the upper edges of the rocks.

30.VII.2005 leg. & det. J. Hafellner (64684)

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287. *Chaenotheca stemonea* (Ach.) Müll.Arg.

AUSTRIA, Steiermark (= Styria), Steirisches Randgebirge, Stubalpe, 6 km SW of Köflach, Teigitschgraben 1.3 km WSW of Edelschrott, orographically left bank of the river Teigitsch, 47°01'05"N / 015°02'10"E, MTB 8956/3, 760 m alt., basal area of S-exposed steep cliffs of mica slate (in *Picea abies* forest), on snag of *Picea abies*.

11.IX.2005 leg. & det. J. Hafellner (64689)

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288. *Cladonia parasitica* (Hoffm.) Hoffm.

AUSTRIA, Salzburg, Flachgau, path along the lake Wallersee, E of the swamp "Wenger Moor", 47°55'50"N / 013°12'E, MTB 8045, 510 m alt., on stump of *Quercus robur*.

20.XII.1998 leg. & det. R. Türk (26522)

OBERMAYER W. 2006: *Lichenotheca Graecensis*, Fasc. 15 (Nos 281–300). - Fritschiana 52: 1–6.
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289. *Cystocoleus ebeneus* (Dillwyn) Twaits

AUSTRIA, Steiermark (= Styria), Steirisches Randgebirge, Stubalpe, low highlands about 6 km SSW of Köflach, 1 km SE of Edelschrott, Jurikogel, western ridge just below the summit, 47°00'50"N / 015°03'30"E, MTB 8956/3, 850 m alt., forest with *Picea abies* and *Pinus sylvestris* (with outcrops of mica slate), on N-exposed, overhanging faces of rocks (entirely shaded).

11.IX.2005 leg. & det. J. Hafellner (64638)

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290. *Flavocetraria nivalis* (L.) Kärnefelt

[sorediate form !]

RUSSIA, Murmansk Oblast, Khibiny Mountains, Paachiok River valley between Takhtarvumchorr Mountain and Pachvumchorr range, 68°00'N / 033°10'E, 500 m alt., mountain tundra, on soil.

Note: All specimens with well developed soralia. Specimen in GZU with apothecia.

8.VIII.1997 leg. & det. M. Zhurbenko (9770)

OBERMAYER W. 2006: *Lichenotheca Graecensis*, Fasc. 15 (Nos 281–300). - Fritschiana 52: 1–6.
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291. *Imshaugia aleurites* (Ach.) S.L.F.Meyer

AUSTRIA, Oberösterreich (= Upper Austria), Dachstein-Gruppe, 4.2 km SSW of Hallstatt, path between the refuges Tiergartenhütte and Wiesberghaus, 47°31'49"N / 013°36'58"E, MTB 8447/4, 1580 m alt., on decayed bark of *Larix decidua* (inclined stem).

Note: Specimen kept in the herbarium of the collector with apothecia.

11.VIII.2005 leg. & det. R. Türk (37881)

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292. *Lecanora sambuci* (Pers.) Nyl.

GERMANY, Bayern (= Bavaria), Berchtesgadener Land, Bischofswiesen, between Götschenalm and Kollerlehen, 47°38'55"N / 012°56'15"E, 850 m alt., on bark of *Acer pseudoplatanus*.

11.VI.1992 leg. & det. R. Türk (26356) & H. Wunder

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293. *Lobaria 'parapulmonaria'* ined.

CHINA, Tibet, prov. Xizang, Nyanqentanglha Shan, 360 km E of Lhasa near the bend of the river Tsangpo, N-side of Gyala Peri, 10 km S of Dongjug village, 29°54'N/094°52'E, 3700 m alt., W-side of the glacier, near a mountain pasture hut, on *Abies*, bryophytes and ground.

Note: TLC (all specimens investigated): Retigeranic acid A (maj.), stictic acid (maj.), constictic acid (maj.), norstictic acid (min.), terpenoid (maj., 5-6/5/5-6, always slightly above zeorin, probably retigeranic acid B). Retigeric acid A + B not detected. The stictic acid complex is missing in one sample. The present taxon strongly resembles *Lobaria pulmonaria* in shape of thallus and in shape and development of young soralia. *L. 'parapulmonaria'* differs in the brown colour of the thallus (due to cyanobacteria), the slightly dorsiventrally flattened isidia-like structures (cylindrical in European material of *L. pulmonaria*), and the occurrence of two terpenoids (retigeranic acid A and ?retigeranic acid B) in rather high concentration. The taxon can be regarded as a close relative of *L. pulmonaria* but containing cyanobacteria as the major photobiont.

20.VIII.1994 leg. & det. W. Obermayer (10581)

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294. *Micarea melaena* (Nyl.) Hedl.

AUSTRIA, Oberösterreich (= Upper Austria), Dachstein-Gruppe, 4.2 km SSW of Hallstatt, path between the refuges Tiergartenhütte and Wiesberghaus, 47°31'47"N/013°37'10"E, MTB 8447/4, 1600 m alt., on bark of *Larix decidua*.

11.VIII.2005 leg. & det. R. Türk (37876)

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295. *Normandina acroglypta* (Norman) Aptroot

AUSTRIA, Salzburg, Nördliche Kalkalpen, Hagengebirge, Bluntauental W of Golling, 1 km SW of the Bluntau mühle, 47°34'35"N/013°08'25"E, MTB 8444/2, 490 m alt., mixed forest (rich in *Picea abies*) near brookside, on *Salix*.

Note: Original sample in GZU with ascomata.

1.IX.1996 leg. & det. J. Hafellner (47308)

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296. *Rinodina glauca* Ropin

AUSTRIA, Kärnten (= Carinthia), Hohe Tauern National Park, 4 km SE of Heiligenblut, orographically right bank of the river Möll, W of Aichhorn, 47°00'40"N/012°52'05"E, MTB 8943/3, 1100 m alt., *Alnus incana* riverine forest, on *Salix* spec.

21.XI.1987 leg. M. Walther & J. Hafellner (17919), det. H. Mayrhofer (2005)

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297. *Squamarina cartilaginea* (With.) P.James

ITALY, Calabria, prov. Cosenza, Campotenese, below Il Fortino, 39°53'05"/016°03'45", 1050 m alt., S-exposed dry grassland over limestone, on soil.

3.VI.1979 leg. & det. J. Hafellner (41502)

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298. *Stereocaulon alpinum* Laurer

AUSTRIA, Tirol, Zillertaler Alpen, 200 m S of Berliner Hütte, front end of the glacier 'Hornkees', 47°01'26"N/011°48'54"E, MTB 8936, 2030 m alt., on sandy soil of a moraine.

19.VII.2002 leg. & det. R. Türk (32462)

OBERMAYER W. 2006: *Lichenotheca Graecensis*, Fasc. 15 (Nos 281–300). - Fritschiana 52: 1–6.
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299. *Usnea amblyoclada* (Müll.Arg.) Zahlbr.

URUGUAY, Montevideo, Rio de la Plata, Isla de Flores, central part of the island, 34°56'S/055°55'W, aerohaline zone, on rocky outcrops.

Note: Observed only at this collection site, but with a luxurious growth. Duplicates already have been issued in 'Dupla Graecensia Lichenum 2002', no. 195.

31.X.2000 leg. & det. H.S. Osorio (9402b)

OBERMAYER W. 2006: *Lichenotheca Graecensis*, Fasc. 15 (Nos 281–300). - Fritschiana 52: 1–6.
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300. *Xanthoria candelaria* (L.) Th.Fr.

AUSTRIA, Salzburg, Niedere Tauern, Schladminger Tauern, 25 km NW of Murau, 12 km W of Krakaudorf, Prebersee, 47°11'05"N/013°51'30"E, MTB 8849/1, 1515 m alt., southeastern area of the lakeshore, on twigs of *Picea abies*.

Note: Many specimens with apothecia. All specimens intermixed with *Melanohalea exasperatula*.

17.VIII.2005 leg. & det. W. Obermayer (10895)

Dupla Graecensia Lichenum (2006, nos 401–480)

Walter OBERMAYER*

OBERMAYER W. 2006: Dupla Graecensia Lichenum (2006, nos 401–480). - Fritschiana (Graz) 52: 7–29. – ISSN 1024-0306.

Abstract: Dupla Graecensia Lichenum (2006, nos 401–480) comprises 80 collections of lichen duplicates from Armenia (Kotayk' Marz), Australia (New South Wales; Tasmania), Austria (Styria; Salzburg; Tirol; Upper Austria), China (Tibet, prov. Xizang; prov. Sichuan), Czech Republic (South Bohemia), Greece (Aegean Islands), New Zealand (North Island), Russia (Komi Republic; Krasnoyarsk Territory; Murmansk Region), Turkey (Hatay), and Uruguay (Artigas; Rocha; Salto; San José). TLC-investigations were carried out for 9 lichenized taxa (*Alectoria ochroleuca*, *Bryoria bicolor*, *Cladonia macrophyllodes*, *C. mitis*, *Lepraria caesia*, *L. lobificans*, *Lobaria orientalis*, *Megalania pulverea*, and *Nephromopsis morrisonicola*). *Nephromopsis morrisonicola* and *Tuckneraria laureri* are issued as part of the results of the 'Sino-Austrian Joint Expedition to the SE-Tibetan Fringe Mountains (=Hengduan Shan), Sichuan Province, China (July/August 2000)'. *Lobaria orientalis* is presented as part of the results of the 'Sino-German Joint Expedition to Southeastern and Eastern Tibet 1994'.

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The dwarf-exsiccata 'Dupla Graecensia Lichenum' are issued by the herbarium of the Institute for Plant Sciences of the Karl-Franzens-University, Graz, Austria (international abbreviation: GZU). It includes lichens and lichenicolous fungi from all over the world with five to ten duplicates of each collection. Each institution receiving a duplicate is cited (at the bottom line of each individual label) with its international herbarium abbreviation (see <http://sciweb.nybg.org/science2/IndexHerbariorum.asp>): The herbaria in Canberra (CANB), Graz (GZU), Munich (M), New York (NY), and Uppsala (UPS) are receiving all distributed specimens continuously. To make every single specimen unique, the abbreviation of the herbarium, where the specimen should be housed, is underlined on the labels. Abbreviations of authors of plant names are taken from http://brimsa.huh.harvard.edu/cms-wb/botanist_index.html. Names of countries and states (or provinces or principal subdivisions) can be found under <http://www.ars-grin.gov/cgi-bin/npgs/html/geolist.pl>. Dupla Graecensia Lichenum is published as text version under <http://www-ang.kfunigraz.ac.at/~oberma/dupl-graec.htm>. Label texts originally drafted in a local language have been translated into English by the author.

I wish to thank all the collectors and keepers of private herbaria for their contributions, in particular Josef Hafellner, Shahane Harutyunyan, Volker John, Michaela Lambauer, Helmut Mayrhofer, Héctor S. Osorio, Harrie Sipman, Roman Türk, and Mikhail Zhurbenko. Thanks are also due to several colleagues, who helped with determinations (Teuvo Ahti, Pieter van den Boom, Thorsten Lumbsch, and Tiina Randlane). Field works in Tibet (1994 and 2000) were supported by the 'Austrian Science Fund' (project numbers P09663-BIO and P13676-BIO).

OBERMAYER W. 2006: Dupla Graecensia Lichenum (2006, nos 401–480). - Fritschiana 52: 7–29. Distributed by the Institut für Pflanzenwissenschaften, Karl-Franzens-Universität, Graz (GZU)

401. Alectoria ochroleuca Nyl.

AUSTRIA, Steiermark (=Styria), Steirisches Randgebirge, Stubalpe, 17.5 km W of Köflach, 2 km SW of Salztiegelhaus (Hirscheggertal), near the cross on a lower peak 0.5 km SE of the mountain Speikkogel, 47°03'20"-25"N / 014°51'05"-10"E, MTB 8955/1, 1950 m alt., alpine meadows with amphibolitic (and gneissic) boulders, on soil (over rocks). – 24.X.2004, leg. & det. W. Obermayer (10498).

Note: TLC: Usnic acid, diffractaic acid.

distributed to: CANB, GZU, E, HMAS, M, MIN, NY, UPS

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402. Biatora turgidula (Fr.) Nyl.

AUSTRIA, Steiermark (=Styria), Nördliche Kalkalpen, Hochschwab-Gruppe, Pfaffenstein N of Eisenerz, along the path 'Markussteig', below the striking rock ridge SE in front of the mountain Kesselmauer, 47°33'20"N / 014°54'05"E, MTB 8455/1, 1300 m alt., forest with *Picea abies* (steep S-exposed slope), on wood of decaying stumps. – 3.VIII.2004, leg. & det. J. Hafellner (63441).

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403. Brodoa intestiniformis (Vill.) Goward

RUSSIA, Komi Republic, Northern Ural, 165 km ESE of Troitsko-Pechorsk, upper stream of Pechora river, Pechora-Ilych state reserve, top of Yanypupuner range, 62°05'N / 059°06'E, 750-800 m alt., wet moss-lichen-dwarf-shrub tundra with stone field, on small rocks. – 3.VII.1997, leg. & det. M. Zhurbenko (9778).

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404. Bryoria bicolor (Ehrh.) Brodo & D. Hawksw.

AUSTRIA, Oberösterreich (=Upper Austria), Dachstein-Gruppe, 4.2 km SSW of Hallstatt, path between the refuges Tiergartenhütte and Wiesbergshaus, 47°31'47"N / 013°37'10"E, MTB 8447/4, 1600 m alt., on bark of *Larix decidua*. – 11.VIII.2005, leg. & det. R. Türk (37880).

Note: TLC: Fumarprotocetraric acid.

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405. *Bryoria capillaris* (Ach.) Brodo & D.Hawksw.

AUSTRIA, Steiermark (=Styria), Seetaler Alpen, 10 km WNW of Obdach, road from Schmelz to Winterleitenhütte, 47°05'45"N / 014°34'40"E, MTB 8953/1, 1650 m alt., close to a forest road in a high montane forest with *Picea abies* and *Pinus cembra*, on twigs of *Pinus cembra* (SSE-exposed; shadowed). – 1.VI.2005, leg. & det. W. Obermayer (10976).

Note: Associated *Bryoria implexa* chemotype 2 (= *Bryoria kuemmerleana*) with K+ red thallus (nor-stictic acid crystals) has been separated and is issued in the present fascicle..

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406. *Bryoria implexa* (Hoffm.) Brodo & D.Hawksw.

[chemotype 2 = *B. kuemmerleana*]

AUSTRIA, Steiermark (=Styria), Seetaler Alpen, 10 km WNW of Obdach, road from Schmelz to Winterleitenhütte, 47°05'45"N / 014°34'40"E, MTB 8953/1, 1650 m alt., close to a forest road in a high montane forest with *Picea abies* and *Pinus cembra*, on twigs of *Pinus cembra* (SSE-exposed; shadowed). – 1.VI.2005, leg. & det. W. Obermayer (10977).

Note: Associated specimens of *Bryoria capillaris* (thallus K+ yellow) have been separated and are issued in the present fascicle. The cited species and *B. subcana* can be partly intermixed.

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407. *Buellia ocellata* (Flot.) Körb.

AUSTRIA, Steiermark (=Styria), Steirisches Randgebirge, Joglland, 6 km NE of Pöllau, Masenberg, summit area, 47°20'55"N / 015°52'30"E, MTB 8661/3, 1260 m alt., mixed forest with low siliceous outcrops, on SE-exposed, sunny faces of mica slate. – 19.X.2003, leg. & det. J. Hafellner (61915).

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408. *Caloplaca cerina* (Ehrh. ex Hedw.) Th.Fr.

AUSTRIA, Steiermark (=Styria), Sausal, 9 km W of Leibnitz, NW of Kitzeck, 46°47'35"N / 015°26'00"E, MTB 9258/2, 480 m alt., old orchard, on stem bark of *Juglans regia*. – 25.III.2000, leg. & det. J. Hafellner (50713).

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409. *Caloplaca coccinea* (Müll.Arg.) Poelt

AUSTRIA, Steiermark (=Styria), Nördliche Kalkalpen, Hochschwab-Gruppe, 7.5 km NW of Aflenz, Fölzstein, just W of the summit, upper edge of the S-exposed rock surfaces, 47°35'45"N / 015°10'30"E, MTB 8457/1, 1900 m alt., limestone rocks and *Caricetum firmae*, on inclined rock faces. – 20.IX.2003, leg. & det. J. Hafellner (62641).

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410. *Caloplaca haematites* (St.-Amans) Zwackh

GREECE, Aegean Islands, Nomos Samos, Ikaria Island, above Ag.Paraskevi, along the road from the airport to Perdiki, 37°40.32'N / 026°19.47'E, 225 m alt., old orchard, on trunk of *Olea europaea*. – 15.IX.2002, leg. H. Sipman (48466) & T. Raus, det. H. Sipman.

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411. *Caloplaca saxicola* (Hoffm.) Nordin

AUSTRIA, Steiermark (=Styria), Steirisches Randgebirge, Fischbacher Alpen, Kleiner Pfaffenbachgraben NE of Retteneegg, near the first hairpin bend of the road to Pfaffen-sattel, 47°33'25"N / 015°48'25"E, MTB 8460/2, 1040 m alt., steep calcareous rocks in a mixed forest, on shadowed overhanging rock faces. – 24.VII.2002, leg. & det. J. Hafellner (59512).

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412. *Catillaria nigroclavata* (Nyl.) Schuler

AUSTRIA, Steiermark (=Styria), Niedere Tauern, Schladminger Tauern, Obertal S of Schladming, between Hopfriesen and the inn Tauerngold, 47°19'05"N / 013°41'20"E, MTB 8648/3, 1060 m alt., *Alnus incana* trees near the brookside, on *Alnus incana*. – 25.VIII.2001, leg. & det. J. Hafellner (56867), W. Obermayer & R. Stordeur.

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413. *Chaenotheca hispidula* (Ach.) Zahlbr.

AUSTRIA, Steiermark (=Styria), Niedere Tauern, Triebener Tauern, S of Trieben, Großer Griebstein, gently inclined slopes at the N-facing foot of the mountain, S above the shrine near the farm building 'Eberl', 47°24'35"N/014°33'05"E, MTB 8553/3, 1160 m alt., forest with *Picea abies* and some *Acer pseudoplatanus*, on bark of *Acer pseudoplatanus*. – 15.VIII.2000, leg. & det. J. Hafellner (58711).

Note: Partly associated with *Chaenotheca trichialis*. All specimens with *Chrysothrix candelaris*.

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414. *Chaenotheca stemonea* (Ach.) Müll.Arg.

AUSTRIA, Steiermark (=Styria), Niedere Tauern, Schladminger Tauern, Obertal S of Schladming, valley of Giglachbach, on the path to Lackneralm, 47°18'50"N/013°41'10"E, MTB 8648/3, 1100 m alt., *Picea abies* forest with *Alnus incana* (wet foot of a slope), on bark of *Larix decidua*. – 25.VIII.2001, leg. J. Hafellner (56802), W. Obermayer & R. Türk, det. J. Hafellner.

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415. *Chaenothecopsis pusilla* (Ach.) A.F.W.Schmidt

CZECH REPUBLIC, Jihočeský Kraj (=South Bohemia), Böhmerwald (=Šumava), Plöckenstein (=Plechý) mountain, 11 km NNW of Ulrichsberg, 48°46'20"N/013°51'30"E, MTB 7243, 1310 m alt., on wood of *Picea abies*. – 05.IV.1994, leg. J. Poelt & R. Türk (20323), det. R. Türk.

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416. *Cladonia anaemica* (Nyl.) Ahti

URUGUAY, Rocha, 59 km NE of Rocha, 6 km N of Palmar de Castillos, Cerro de los Rochas, 34°09'15"S/053°51'35"W, 100 m alt., S-facing slope, on rocks. – 25.IV.2003, leg. H.S. Osorio (9658) & G. Geymonat, det. T. Ahti (2003).

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417. *Cladonia digitata* (L.) Hoffm.

AUSTRIA, Steiermark (=Styria), Steirisches Randgebirge, Gleinalpe, Mugel S of Niklasdorf, slopes below Ochsenstall, 47°22'15"N/015°11'25"E, MTB 8657/1, 1060 m alt., *Picea abies* forest, on bryophytes covering a siliceous rock. – 6.X.2001, leg. & det. J. Hafellner (57286).

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418. *Cladonia dilleniana* Flörke

CUBA, Holguin, Sierra de Moa, 200 m alt., on ground. – IV.1981, leg. O. Miersch (C-1981-2), det. T. Ahti (1981).

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419. *Cladonia furcata* (Huds.) Schrader ssp. *furcata*

AUSTRIA, Steiermark (=Styria), Steirisches Randgebirge, Stubalpe, 15 km W of Köflach, 7.5 km NW of Hirscheegg, 0.4 km NW of Kochbauer, 47°03'35"N/014°52'50"E, MTB 8955/1, 1340 m alt., mixed forest with *Picea abies*, *Fagus sylvatica*, and *Larix decidua*, on ground. – 30.VII.2005, leg. & det. W. Obermayer (10894).

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420. *Cladonia macrophylla* (Schaer.) Stenh.

AUSTRIA, Steiermark (=Styria), Nördliche Kalkalpen, Hochschwab-Gruppe, Polster E of Eisenerz, ridge and NW-facing slopes straight below the summit, 47°32'05"N/014°57'50"E, MTB 8455/4, 1840 m alt., siliceous bedrock ('Präbichlschichten', 'Werfener Schiefer'), on ground (wind exposed). – 10.IX.2004, leg. & det. J. Hafellner (63158).

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421. *Cladonia macrophyllodes* Nyl.

AUSTRIA, Steiermark (=Styria), Seetaler Alpen, 10,5 km W of Obdach, path from Großer Winterleitensee via Ochsenboden to Kreiskogel, 47°05'05"N/014°33'35"E, MTB 8953/1, 1970 m alt., alpine meadows with boulders, on ground. – 16.V.2002, leg. & det. W. Obermayer (10182).

Note: TLC (all specimens tested): atranorin, fumarprotocetraric acid, protocetraric acid (min.), terpenoid (5/5-6/5-6).

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422. *Cladonia mitis* Sandst.

AUSTRIA, Steiermark (=Styria), Steirisches Randgebirge, Stubalpe, 17,5 km W of Köflach, 2 km SW of Salzstiegelhaus (Hirscheeggertal), near the cross on a lower peak 0,5 km SE of the mountain Speikkogel, 47°03'20-25"N/014°51'05-10"E, MTB 8955/1, 1940-1960 m alt., alpine meadows with amphibolitic (and gneissic) boulders, on ground (over rocks). – 24.X.2004, leg. & det. W. Obermayer (10499).

Note: TLC: Usnic acid (maj.), fatty acids of the rangiformic/norrangiformic acid complex (maj./min.).

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423. *Cladonia pocillum* (Ach.) Grognot

RUSSIA, Krasnoyarsk Krai (N of Central Siberia), Severnaya Zemlya Archipelago, N extremity of Bol'shevik Island, W coast of Mikoyan Bay, 200 m off the bay coast, 79°18'N/101°55'E, 10 m alt., moist to mesic silt-gravelly slope of a coastal terrace with well developed porous microrelief of small knobs and *Papaver*-graminoid-lichen-bryophyte vegetation in micro-depressions, on soil. – 21.VII.1996, leg. & det. M. Zhurbenko (96468).

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424. *Cladonia uncialis* (L.) Weber ex F.H.Wigg. ssp. *biuncialis* (Hoffm.) M.Choisy

RUSSIA, Krasnoyarsk Krai (N of Central Siberia), Severnaya Zemlya Archipelago, N part of Bol'shevik Island, W-coast of Akhmatov Bay, 6 km SSW of the Bazovaya river mouth, 1 km off the bay coast, 79°04'N/102°42'E, 40 m alt., moist silt-gravelly flat coastal plain with sparse lichen-bryophyte-graminoid (cushions) vegetation, on soil. – 17.VII.1996, leg. & det. M. Zhurbenko (96434).

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425. *Dermatocarpon miniatum* (L.) W.Mann

AUSTRIA, Steiermark (=Styria), Steirisches Randgebirge, Fischbacher Alpen, Kleiner Pfaffenbachgraben NE of Rettenegg, near the first hairpin bend of the road to Pfaffensattel, 47°33'25"N/015°48'25"E, MTB 8460/2, 1040 m alt., steep calcareous rocks in a mixed forest, on shadowd, strongly inclined rock surfaces. – 24.VII.2002, leg. & det. J. Hafellner (59513).

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426. *Diploschistes muscorum* (Scop.) R.Sant.

AUSTRIA, Oberösterreich (=Upper Austria), N of Bad Ischl, Hinterhaaleswiesalm N of Leonsberg, 47°46'18"N/013°32'30"E, MTB 8247/1, 820 m alt., pasture wall (with calcareous rocks), on bryophytes and parasitic on squamules of *Cladonia pyxidata*. – 19.VIII.2004, leg. & det. R. Türk (35159).

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427. *Diploschistes muscorum* (Scop.) R.Sant.

[lichenicolous lichen on squamules of *Cladonia*]

AUSTRIA, Steiermark (=Styria), SSE-facing slopes of Schöckl, 2 km N of St.Radegund, forest area between Römerweg and Schöcklkopf, 47°12'00"N/015°29'00"E, MTB 8758/4, 1100 m alt., slopes of a forest road and adjacent mixed forest (with *Fagus sylvatica*, *Pinus sylvestris*, and *Picea abies*), above calcareous ground and rocks, on decayed stump. – 8.VI.2005, leg. & det. W. Obermayer (10680).

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428. *Fellhanera bouteillei* (Desm.) Vězda

AUSTRIA, Steiermark (=Styria), Niedere Tauern, Schladminger Tauern, Obertal S of Schladming, valley of Giglachbach, on the path to Lackneralm, 47°18'50"N/013°41'10"E, MTB 8648/3, 1100 m alt., *Picea abies* forest with *Alnus incana* (wet bottom of a slope), on needles of *Picea abies* (edge of a wood). – 25.VIII.2001, leg. J. Hafellner (56816), W. Obermayer & R. Türk, det. J. Hafellner.

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429. *Flavoparmelia caperata* (L.) Hale

AUSTRIA, Steiermark (=Styria), Steirisches Randgebirge, Stubalpe, 14.5 km W of Köflach, 6.3 km NW of Hirscheegg, valley of the brook Rafflerbach, 0.7 km SE below Kochbauer, 47°03'10"N/014°53'30"E, MTB 8955/1, 1100 m alt., *Salix* trees along the brookside, on *Salix caprea*. – 24.X.2004, leg. & det. W. Obermayer (10500).

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430. *Graphis scripta* (L.) Ach.

AUSTRIA, Steiermark (=Styria), Oststeirisches Riedelland, 12 km E of the centre of Graz, Laßnitzhöhe, 300 m NE of the tavern 'Höchs Schmied', 47°04'00"N/015°35'40"E, MTB 8959/2, 470 m alt., mixed forest (close to a small tunnel), on bark of *Corylus avellana*. – 16.XII.2004, leg. & det. W. Obermayer (10558).

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431. *Halecania australis* Lumbsch

AUSTRALIA, New South Wales, Nelson Bay, Boulder Bay / Snapper Point, 32°45'33"S / 152°09'43"E, 10 m alt., spray zone, N exposed, on granitic rocks. – 23.X.2003, leg. M. Lambauer (0075) & R. Filson, det. P.P.G. van den Boom (2004).

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432. *Halecania australis* Lumbsch

AUSTRALIA, Tasmania, Midland Highway, Dysart N of Bagdad, 42°35'S / 147°13'E, 250 m alt., sandstone cliffs, on rocks. – 6.VIII.1992, leg. H. Mayrhofer (12072) & E. Hierzer, det. P.P.G. van den Boom (2004).

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433. *Hypogymnia bitteri* (Lynge) Ahti

AUSTRIA, Steiermark (=Styria), Niedere Tauern, Seckauer Tauern, Speikbichl N of Knittelfeld, S-facing slopes towards Feistrizgraben, above Schwaigerhütte, 47°20'55"N / 014°49'05"E, MTB 8854/4, 1540 m alt., forest with *Picea abies* and *Larix decidua*, on bark of *Larix decidua*. – 22.VI.2000, leg. J. Hafellner (51718) & A. Hafellner, det. J. Hafellner.

Note: Lobes unusually pale coloured.

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434. *Hypocenomyce leucococca* R.Sant.

AUSTRIA, Steiermark (=Styria), Niedere Tauern, Triebener Tauern, Vordertriebental SSE of Trieben, 1 km SE of the tavern Brodjäger, N-facing foot of the mountain Tierkogel, 47°26'30"N / 014°31'25"E, MTB 8553/3, 1050 m alt., waterside grove, on bark of *Alnus incana*. – 26.VIII.2002, leg. J. Hafellner (58985) & J. Miadlikowska, det. J. Hafellner.

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435. *Icmadophila ericetorum* (L.) Zahlbr.

RUSSIA, Komi Republic, Northern Ural, Pechora-Ilych state reserve, upper stream of Pechora River, valley between Mt. Medvezh'ya and Yanypupuner Range, 62°05'N / 059°06'E, spruce taiga forest, on moribund mosses, rotten wood and pebbles. – 4.VII.1997, leg. & det. M. Zhurbenko (97137).

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436. *Lecania hyalina* (Fr.) R.Sant.

[Syn.: *Bacidia globulosa* (Flörke) Hafellner & V.Wirth]

AUSTRIA, Steiermark (=Styria), Niedere Tauern, Triebener Tauern, S of Trieben, Großer Griefstein, gently inclined slopes at the N-facing base area of the mountain, S above the shrine near the farm building 'Eberl', 47°24'35"N / 014°33'05"E, MTB 8553/3, 1160 m alt., forest with *Picea abies* and some *Acer pseudoplatanus*, on bark of *Acer pseudoplatanus*. – 15.VIII.2000, leg. & det. J. Hafellner (57202).

Note: Partly associated with *Chaenotheca trichialis* and *Ch. hispidula*. All specimens with *Chrysothrix candellaris*.

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437. *Lecanora argentata* (Ach.) Malme

AUSTRIA, Steiermark (=Styria), Niedere Tauern, Triebener Tauern, Vordertriebental SSE of Trieben, 1 km SE of the tavern Brodjäger, N-facing base of Tierkogel, 47°26'30"N / 014°31'25"E, MTB 8553/3, 1050 m alt., waterside grove, on bark of *Alnus incana*. – 26.VIII.2002, leg. J. Hafellner (58971) & J. Miadlikowska, det. J. Hafellner.

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438. *Lecidea fuscoatra* (L.) Ach.

AUSTRIA, Steiermark (=Styria), Steirisches Randgebirge, Joglland, 6 km NE of Pöllau, Masenberg, summit area, 47°20'55"N / 015°52'30"E, MTB 8661/3, 1260 m alt., mixed forest with low siliceous outcrops, on SE-exposed, sunny faces of mica slate. – 19.X.2003, leg. & det. J. Hafellner (61916).

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439. *Lecidea nylanderii* (Anzi) Th.Fr.

AUSTRIA, Steiermark (=Styria), Steirisches Randgebirge, Fischbacher Alpen, Eibeggsattel N of St.Jakob bei Mixnitz, path to Ederkogel, 47°25'15"N / 015°27'00"E, MTB 8558/4, 1030 m alt., forest with *Picea abies* and *Larix decidua* (and some deciduous trees), on bark of *Picea abies*. – 29.IX.1999, leg. & det. J. Hafellner (59579).

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440. *Lecidea polytrichinella* Hertel, Obermayer & Poelt

AUSTRIA, Steiermark (=Styria), Eisenerzer Alpen, Blaseneck N of Treglwang, N-exposed cirque NE below the summit, 47°30'N / 014°37'15"E, MTB 8553/2, 1920 m alt., mossy dwarf shrub heath over paleozoic schist (Blaseneckporphyroid), on *Polytrichum*. – 2.IX.1997, leg. & det. J. Hafellner (59179).

Note: The immarginate, brownish apothecia of *L. polytrichinella* are often associated with the marginate (whitish yellow), mostly flat apothecia of *Lecanora leptacinella*. The latter has been issued from the same locality in 'Lichenotheca Graecensis' no. 200 (Obermayer 2002: Lichenotheca Graecensis, Fasc. 10 & 11 (Nos 181 - 220). – Fritschiana 33: 1-14).

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441. *Lecidella elaeochroma* (Nyl.) Hertel & Leuckert

AUSTRIA, Steiermark (=Styria), Oststeirisches Riedelland, 8.2 km E of the centre of Graz, Kainbach area, 'Auf der Ries', near Pfabenpeter, 47°06'05"N / 015°32'15"E, MTB 8859/3, 560 m alt., mixed forest with *Fagus sylvatica*, *Carpinus betulus*, *Quercus petraea*, and *Pinus sylvestris*, on bark of *Carpinus betulus* (E-exposed, 30-120 cm above ground). – 26.III.2005, leg. & det. W. Obermayer (10658).

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442. *Lepraria caesioalba* (de Lesd.) J.R.Laundon

[chemotype 1a - with atranorin, fumarprotocetraric acid and angardianic acid - present in all specimens]

AUSTRIA, Salzburg, Niedere Tauern, Schladminger Tauern, 24 km NW of Murau, SSW-facing slopes of Preber, path from Sattleben (near Grazer Hütte) to Trogleiteneck, 47°12'15"N / 013°53'00"E, MTB 8749/3, 2100-2200 m alt., alpine pastures with siliceous rocks, on moss cushions (in fissures of vertical rock surfaces). – 17.VIII.2005, leg. & det. W. Obermayer (10971).

Note: TLC investigations were carried out four times with each specimen (on different moss cushions).

Chemotype 1a (present in all specimens): atranorin, fumarprotocetraric acid, protocetraric ac. (tr.), angardianic ac.

Chemotype 1b [= *L. borealis*] (present in specimen in UPS): atranorin (maj.), fumarprotocetraric ac. (maj.), protocetraric ac. (tr.), rangiformic ac. (maj.), norrangiformic ac. (tr.).

Chemotype 1c (in UPS): atranorin (maj.), rangiformic ac. (maj.), norrangiformic ac. (tr.).

Lepraria neglecta s.str. (alectorialic acid, angardianic ac.) intermixed in specimens in GZU, CANB and M.

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443. *Lepraria lobificans* Nyl.

AUSTRIA, Steiermark (=Styria), Oststeirisches Riedelland, 8.2 km E of the centre of Graz, Kainbach-area, 'Auf der Ries', near Pfabenpeter, 47°06'05"N / 015°32'15"E, MTB 8859/3, 560 m alt., mixed forest with *Fagus sylvatica*, *Carpinus betulus*, *Quercus petraea*, and *Pinus sylvestris*, on bark of *Quercus petraea* (30-50 cm above ground, W-exposed, not strongly shaded). – 26.III.2005, leg. & det. W. Obermayer (10662).

Note: TLC: Atranorin, zeorin, stictic acid, constictic acid (all specimens tested at least three times); p.p. admixtures of *Lepraria eburnea* (alectorialic acid, protocetraric acid).

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444. *Lepraria lobificans* Nyl.

AUSTRIA, Steiermark (=Styria), Oststeirisches Riedelland, 8.2 km E of the centre of Graz, Kainbach area, 'Auf der Ries', near Pfabenpeter, 47°06'05"N / 015°32'15"E, MTB 8859/3, 560 m alt., mixed forest with *Fagus sylvatica*, *Carpinus betulus*, *Quercus petraea*, and *Pinus sylvestris*, on bark of *Quercus petraea* (E-exposed, strongly shaded, 5-20 cm above ground). – 26.III.2005, leg. & det. W. Obermayer (10654).

Note: TLC: Atranorin, zeorin, stictic acid, constictic acid (all specimens tested two or three times); one sample additionally contains pannaric-acid-6-methylester (admixture of *Leproloma vouauxii*).

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445. *Lichenomphalia* cf. *hudsoniana* (H.S.Jenn.) Redhead, Lutzoni, Moncalvo & Vilgalys

[Syn.: *Omphalina* h.]

RUSSIA, Komi Republic, Northern Ural, Pechora-Ilych state reserve, upper stream of Pechora River, valley between Mt. Medvezh'ya and Yanypupuner Range, 62°05'N / 059°06'E, 500 m alt., spruce taiga forest, on decaying bryophytes. – 4.VII.1997, leg. & det. M. Zhurbenko (97154).

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446. *Lobaria orientalis* (Asah.) Yoshim.

[chemical race I]

CHINA, Tibet, prov. Xizang, Nyanqentanglha Shan, 360 km E of Lhasa near the bend of the river Tsangpo, N-side of Gyala Peri, 10 km S of Dongjug village, 29°54'N / 094°52'E, 3700 m alt., W-side of the glacier, near a mountain pasture hut, on *Abies* and bryophytes. – 20.VIII.1994, leg. & det. W. Obermayer (10580).

Note: TLC (all specimens tested): Stictic acid (maj.), constictic acid (maj.), gyrophoric acid (maj.), norstictic acid (tr.). Apothecia present in all specimens.

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447. *Megalaria pulverea* (Borrer) Hafellner & E.Schreiner

AUSTRIA, Steiermark (=Styria), Nördliche Kalkalpen, Hochschwab-Gruppe, about 6.7 km E of Hieflau, Schwabeltal, close to the confluence of the brook Schwabelbach with a tributary brook, at the W-facing foot of the mountain Mitterkogel, 47°36'40"N / 014°50'20"E, MTB 8355/3, 730 m alt., mixed forest over limestone boulders, on *Acer pseudoplatanus*. – 16.VIII.2004, leg. & det. J. Hafellner (63629).

Note: TLC: Atranorin, zeorin, fumarprotocetraric acid, 3 fatty acids.

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448. *Melanelixia fuliginosa* (Fr. ex Duby) O.Blanco et al. ssp. *glabratula* (Lamy) ined.

AUSTRIA, Steiermark (=Styria), Niedere Tauern, Triebener Tauern, Vordertriebental SSE of Trieben, 1 km SE of the tavern Brodjäger, N-facing foot of Tierkogel, 47°26'30"N / 014°31'25"E, MTB 8553/3, 1050 m alt., waterside grove, on bark of *Alnus incana*. – 26.VIII.2002, leg. J. Hafellner (58969) & J. Miadlikowska, det. J. Hafellner.

Note: All specimens with apothecia.

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449. *Menegazzia terebrata* (Hoffm.) A.Massal.

AUSTRIA, Steiermark (=Styria), Nördliche Kalkalpen, Hochschwab-Gruppe, about 5.5 km E of Hieflau, Schwabeltal, shortly W of the confluence of the brooks Schwabelbach and Schwarzenbach, 47°37'00"N / 014°49'00"E, MTB 8354/4, 670 m alt., mixed forest above limestone gravel, on *Alnus incana*. – 16.VIII.2004, leg. & det. J. Hafellner (41509).

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450. *Mycobilimbia hypnorum* (Lib.) Kalb & Hafellner

AUSTRIA, Steiermark (=Styria), Niedere Tauern, Triebener Tauern, SW of Wald am Schoberpass, Griesmoar Kogel, northern ridge between the saddle to Himmeleck and the summit, 47°25'15"N / 014°36'10"E, MTB 8553/4, 1950 m alt., low outcrops of mica slate (partly Ca-influenced) in alpine meadows, on naked soil. – 20.VIII.2002, leg. J. Hafellner (58925) & J. Miadlikowska, det. J. Hafellner.

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451. *Nephromopsis morrisonicola* M.J.Lai

CHINA, SE-Tibetan fringe mountains (=Hengduan Shan), prov. Sichuan, Daxue Shan, 57 km S of Kangding, Gongga Shan, Hailougou glacier and forest park, near Hailougou Station, 29°34'35"N / 101°59'50", 3000 m alt., *Abies fabri* forest, on *Rosa spec.* – 28.VII.2000, leg. & det. W. Obermayer (08271).

Note: TLC: Usnic acid, 3 fatty acids of the lichesterinic acid complex. Specimen in GZU with large apothecia (2 cm in diam.).

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452. *Normandina acroglypta* (Norman) Aptroot

AUSTRIA, Steiermark (=Styria), Nördliche Kalkalpen, Hochschwab-Gruppe, about 7.5 km E of Hieflau, lowermost NW-facing slopes of the mountain Kaltmauer, north of the valley Wurmgraben, 47°36'30"N / 014°51'00"E, MTB 8355/3, 850 m alt., mixed forest over limestone boulders, on bark of *Fagus sylvatica*. – 16.VIII.2004, leg. & det. J. Hafellner (63717).

Note: The specimen in GZU shows a few perithecia.

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453. *Opegrapha rufescens* Pers.

AUSTRIA, Steiermark (=Styria), Sausal, 5 km W of Leibnitz, SE-facing base of Demmerkogel, lower part of Stumpfgraben NW of Heimschuh, 46°46'15"N / 015°28'45"E, MTB 9258/2, 300 m alt., mixed forest, on stem bark of *Carpinus betulus*. – 25.III.2000, leg. & det. J. Hafellner (51080).

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454. *Opegrapha vermicellifera* (Kunze) J.R.Laundon

AUSTRIA, Steiermark (=Styria), Sausal, E-facing foot area of Demmerkogel, hindmost part of Kreisgraben below Kitzeck, 46°47'20"N / 015°26'10"E, MTB 9258/2, 400 m alt., mixed forest, on stem bark of *Tilia*. – 25.III.2000, leg. & det. J. Hafellner (50859).

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455. *Parmelia submontana* Nádv. ex Hale

AUSTRIA, Steiermark (=Styria), Nördliche Kalkalpen, Hochschwab-Gruppe, 4 km E of Eisenerz, Gsoll, path to Gsollhütte, near the junction of the Winterebengraben and the Gsollbachgraben, 47°33'05"N / 014°56'30"E, MTB 8455/2, 950 m alt., edge of a forest, on bark of *Acer pseudoplatanus*. – 18.IX.2003, leg. & det. J. Hafellner (62093).

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456. *Parmelina pastillifera* (Harm.) Hale

AUSTRIA, Steiermark (=Styria), Nördliche Kalkalpen, Hochschwab-Gruppe, 8 km E of Eisenerz, W-facing slopes below Frauenmauer, NE above Gsollhütte, path to the westerly entrance of the cave 'Frauenmauerhöhle', 47°33'30"N / 014°58'15"E, MTB 8455/2, 1300 m alt., scattered remnants of an autochthonous forest with *Acer pseudoplatanus* and *Fagus sylvatica* (within a spruce forest), on bark of *Acer pseudoplatanus*. – 18.IX.2003, leg. & det. J. Hafellner (62738).

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457. *Parmeliopsis ambigua* (Wulfen) Nyl.

AUSTRIA, Steiermark (=Styria), Steirisches Randgebirge, Stubalpe, 15 km W of Köflach, 7.5 km NW of Hirscheegg, 0.4 km NW of Kochbauer, 47°03'35"N / 014°52'50"E, MTB 8955/1, 1340 m alt., border area of a ski-slope, on rotten trunk (vertical surface). – 30.VII.2005, leg. & det. W. Obermayer (10788).

Note: All specimens show the two other typical species of the *Parmeliopsis* detum ambiguae, *Parmeliopsis hyperopta* and *Vulpicida pinastris*.

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458. *Parmotrema delicatulum* (Vain.) Hale

URUGUAY, San José, Sierra Mahoma, 34°05'S / 056°56'W, 100-200 m alt., on top of a big boulder (locally abundant). – 31.VIII.1969, leg. & det. H.S. Osorio (6219b).

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459. *Pertusaria coronata* (Ach.) Th.Fr.

AUSTRIA, Steiermark (=Styria), Nördliche Kalkalpen, Hochschwab-Gruppe, Hackentörl SW above Seewiesen, 47°36'20"N / 015°15'05"E, MTB 8357/4, 1290 m alt., mixed forest, on bark of *Fagus sylvatica*. – 11.IX.2004, leg. & det. J. Hafellner (63309).

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460. *Pertusaria werneriana* Boqueras

GREECE, Aegean Islands, Nomos Samos, Icaria Island, Kamara, ENE of Vathi, 37° 45.98'N / 027°00.59'E, 160 m alt., macchia on NW-facing slope, on stunted *Quercus coccifera*. – 25.IX.2002, leg. H. Sipman (49605) & T. Raus, det. H. Sipman.

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OBERMAYER W. 2006: **Dupla Graecensia Lichenum** (2006, nos 401–480). - Fritschiana 52: 7–29.
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461. *Petractis hypoleuca* (Ach.) Vězda

AUSTRIA, Steiermark (=Styria), Nördliche Kalkalpen, Hochschwab-Gruppe, about 7.5 km E of Hieflau, lowermost NW-facing slopes of the mountain Kaltmayer, north of the valley Wurmgraben, 47°36'30"N / 014°51'00"E, MTB 8355/3, 850 m alt., mixed forest over limestone boulders, on shadowed limestone rocks. – 16.VIII.2004, leg. & det. J. Hafellner (63694).

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462. *Phaeorrhiza* cf. *sareptana* (Tomim) H.Mayrhofer & Poelt

RUSSIA, Krasnoyarsk Krai (N of Central Siberia), Severnaya Zemlya Archipelago, N part of Bol'shevik Island, western coast of Akhmatov Bay, 7 km SW of the mouth of Bazovaia River, 100 to 200 m away from the bay coast, flat coastal terrace, 79°04'N / 102°45'E, 20 m alt., fine to medium gravel with silt, on soil. – 15.VII.1996, leg. M. Zhurbenko (96290-1), det. W. Obermayer.

Note: *Phaeorrhiza nimbosa*, which has been issued from the same locality in 'Dupla Graecensia Lichenum' no 68 (Obermayer, W. 1999: Dupla Graecensia Lichenum (1999). - Fritschiana 21: 13–30), can be partly intermixed.

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463. *Physcia adscendens* (F.) H.Olivier

AUSTRIA, Steiermark (=Styria), Steirisches Randgebirge, Stubalpe, 15 km W of Köflach, 7.5 km NW of Hirscheegg, 0.4 km NW of Kochbauer, 47°03'35"N / 014°52'50"E, MTB 8955/1, 1340 m alt., border area of a ski-slope, on *Acer pseudoplatanus* (strongly shadowed stem base). – 30.VII.2005, leg. & det. W. Obermayer (10789).

Note: *Physcia dubia* var. *teretiuluscula* is intermixed in some specimens.

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464. *Physcia biziana* (A.Massal.) Zahlbr.

ARMENIA, Kotayk' Marz, Jrvej, Yerevan-Geghard highway, 40°11'25"N / 044°38'25"E, 1300 m alt., road embankment along the highway, on bark of *Acacia* spec. – 2.X.2005, leg. S. Harutyunyan (00073), det. W. Obermayer.

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465. Physcia dubia (Hoffm.) Lettau
var. *teretiuscula* (Ach.) Clauzade & Cl.Roux

AUSTRIA, Steiermark (=Styria), Steirisches Randgebirge, Stubalpe, 15 km W of Köflach, 7.5 km NW of Hirscheegg, near the penultimate switchback before reaching the bottom station of the Salzstiegel ski-lifts (tavern Moasterboden), 47°03'40"N/014°53'00"E, MTB 8955/1, 1260 m alt., mixed forest with *Picea abies*, *Larix decidua*, *Fagus sylvatica*, and *Acer pseudoplatanus*, close to a brook, on *Acer pseudoplatanus*. – 30.VII.2005, leg. & det. W. Obermayer (10825).

Note: Contrary to *Physcia dubia* s.str., the medulla of var. *teretiuscula* becomes slowly pale yellow with KOH, the lobes are finger-shaped and strongly convex.

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466. Physconia perisidiosa (Erichsen) Moberg

AUSTRIA, Steiermark (=Styria), Nördliche Kalkalpen, Hochschwab-Gruppe, 8 km E of Eisenerz, W-facing slopes below Frauenmauer, NE above Gsollhütte, path to the westerly entrance of the cave 'Frauenmauerhöhle', 47°33'30"N/014°58'15"E, MTB 8455/2, 1300 m alt., scattered remnants of an autochthonous forest with *Acer pseudoplatanus* and *Fagus sylvatica* (within a spruce forest), on bark of *Acer pseudoplatanus*. – 18.IX.2003, leg. & det. J. Hafellner (62745).

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467. Punctelia ulophylla (Ach.) Herk & Aptroot

AUSTRIA, Steiermark (=Styria), Steirisches Randgebirge, Stubalpe, 15 km W of Köflach, 7.5 km NW of Hirscheegg, 0.4 km NW of Kochbauer, 47°03'35"N / 014°52'50"E, MTB 8955/1, 1340 m alt., border area of a ski-slope, on *Fagus sylvatica*. – 30.VII.2005, leg. & det. W. Obermayer (10786).

Note: Diagnostic characters (against *P. subrudecta*) are the pruinose thallus margins and the (mostly) marginal soredia.

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468. Pycnora sorophora (Vain.) Hafellner

AUSTRIA, Steiermark (=Styria), Nördliche Kalkalpen, Hochschwab-Gruppe, Pfaffenstein N of Eisenerz, along the path 'Markussteig', below the striking rock-ridge SE in front of the mountain Kesselmauer, 47°33'20"N / 014°54'05"E, MTB 8455/1, 1300 m alt., forest with *Picea abies* (steep S-exposed slope), on wood of decaying stumps. – 3.VIII.2004, leg. & det. J. Hafellner (63439).

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469. Pyrenula nitida (Weigel) Ach.

AUSTRIA, Steiermark (=Styria), Sausal, 5 km W of Leibnitz, SE-facing base of Demmerkogel, anterior part of Stumpfgraben NW of Heimschuh, 46°46'15"N/015°28'45"E, MTB 9258/2, 300 m alt., mixed forest, on stem bark of *Carpinus betulus*. – 25.III.2000, leg. & det. J. Hafellner (51088).

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470. Ramalina celastri (Spreng.) Krog & Swinscow

URUGUAY, Salto, Uruguay river and Itapeby brook, 31°12'S / 057°51'W, 10-50 m alt., marginal forest of the Uruguay river, on branches of shrubs. – 5.II.1972, leg. & det. H.S. Osorio (6755).

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471. Ramalina fastigiata (Pers.) Ach.

AUSTRIA, Steiermark (=Styria), Steirisches Randgebirge, Joglland, 6 km NE of Pöllau, Masenberg, summit area, 47°20'55"N / 015°52'30"E, MTB 8661/3, 1260 m alt., mixed forest with low siliceous outcrops, on bark of *Acer pseudoplatanus*. – 19.X.2003, leg. & det. J. Hafellner (61864).

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472. *Rinodina freyi* H.Magn.

AUSTRIA, Tirol, Osttirol, Deferegger Alpen, Defereggental, NW of the bottom station of Brunnalmbahn, W of Sankt Leonhard, 46°54'45"N / 012°20'55"E, MTB 9040/3, 1380 m alt., pasture fences, on pickets (vertical surfaces). – 11.VIII.2004, leg. & det. H. Mayrhofer (16016).

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473. *Rinodina oleae* Bagl.

NEW ZEALAND, North Island, Wellington, Island Bay, S of Wellington, 41°20'50"S / 174°46'48"E, 3-5 m alt., on siliceous coastal rocks. – 23.XI.2003, leg. & det. M. Lam-bauer (0216).

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474. *Sagiolechia protuberans* (Ach.) A.Massal.

AUSTRIA, Steiermark (=Styria), Nördliche Kalkalpen, Hochschwab-Gruppe, 9.5 km NE of Eisenerz, Brandstein, immediately N below the summit, 47°36'05"N / 014°59'00"E, MTB 8355/4, 1990 m alt., striking doline in the uppermost part of the N-facing slope (limestone), on N-exposed steep rock faces. – 5.VIII.2004, leg. & det. J. Hafellner (63338).

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475. *Sarcosagium campestre* (Fr.) Poetsch & Schied.

AUSTRIA, Salzburg, urban area of Salzburg, western area of the Faculty of Natural Sciences (University of Salzburg), 47°47'22"N / 013°03'38"E, MTB 8244/1, 420 m alt., on soil (small cracks in quartzitic porphyry). – 9.V.2005, leg. R. Türk (37487), det. J. Hafellner.

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476. *Stereocaulon condensatum* Hoffm.

RUSSIA, Murmansk Oblast, Barents Sea coast at the mouth of Voron'ya River, 69°15'-20'N / 033°25'-35'E, 10-20 m alt., sand dunes on the river terrace, on sand (abundant). – 30.VIII.1997, leg. & det. M. Zhurbenko (9748).

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477. *Strigula smaragdula* Fr.

URUGUAY, Artigas, Rio Uruguay, Isla Zapallo, 30°31'S / 057°53'W, 40 m alt., forest in the inner part of the island, on leaves of *Cupania vernalis*. – 17./18.VI.1976, leg. & det. H.S. Osorio (7388).

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478. *Tornabaea scutellifera* (With.) J.R.Laundon

TURKEY, Hatay, Dörtyol, between Payas and Hoppa, 36°56'N / 036°25'E, 1500 m alt., on twigs of *Abies silicicus*. – 29.VII.1990, leg. & det. V. John (s.n.1).

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479. *Tuckneraria laureri* (Kremp.) Randlane & Thell

[Syn.: *Nephromopsis laureri* (Kremp.) Kurok.]

CHINA, Tibet, prov. Sichuan, Tibetan fringe mountains (=Hengduan Shan), Shaluli Shan, 56 km NE of Batang, 30°17'10"N / 099°31'15"E, 4300 m alt., conifer forest at a brookside, on rock covered with bryophytes. – 5.VIII.2000, leg. W. Obermayer (08284), det. W. Obermayer, conf. T. Randlane (2001).

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480. Umbilicaria vellea (L.) Hoffm.

RUSSIA, Komi Republic, Northern Ural, 165 km ESE of Troitsko-Pechorsk, upper stream of Pechora river, Pechora-Ilych state reserve, top of Yanyupuner range, 62° 05'N / 059°06'E, 700 m alt., low-alpine heath, rock outcrops 10-20 m height "Zayachii Kamen", on rock faces. – 7.VII.1997, leg. & det. M. Zhurbenko (97145a).

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Lecideoid lecanoralean ascomycetes invading *Rhizocarpon* subgen. *Rhizocarpon* taxa, with special emphasis on cryptothalline species

Josef HAFELLNER*

HAFELLNER J. 2006: Lecideoid lecanoralean ascomycetes invading *Rhizocarpon* subgen. *Rhizocarpon* taxa, with special emphasis on cryptothalline species. – *Fritschiana* (Graz) 52: 31–48. - ISSN 1024-0306.

Abstract: A reinvestigation of the types of *Lecidea halacsyi* Steiner and *Lecidea intrudens* H.Magn., both inhabiting yellow *Rhizocarpon* species, has revealed that these species are not conspecific and belong to different genera. On the other hand, none of them is identical with *Scoliciosporum intrusum* (Th.Fr.) Hafellner as it has been argued in several recent floras and checklists. *Lecidea intrudens* represents a cryptothalline lichenicolous *Carbonea* species identical with *C. halacsyi* sensu Hafellner & Sancho. *Lecidea halacsyi* Steiner is also endocapyllic but does not belong to *Carbonea*. However, for the meanwhile the generic relationship of this species remains unclear. Both species are treated in detail. The new combination *C. intrudens* (H.Magn.) Hafellner is proposed. For *Lecidea halacsyi* Steiner a lectotype is designated.

All together, five fertile lecideoid fungi are known so far that are able to invade taxa of *Rhizocarpon* subgen. *Rhizocarpon*. These species are partly lichenized with a well-developed thallus, partly parasitic/parasymbiotic without a visible thallus. A key to lecideoid lecanoralean fungi invading yellow *Rhizocarpon* species is presented.

Zusammenfassung: Eine Untersuchung der Typusbelege von *Lecidea halacsyi* Steiner und *Lecidea intrudens* H.Magn., beide lichenicol auf gelben *Rhizocarpon*-Arten, hat gezeigt, dass jene nicht konspezifisch sind und zu verschiedenen Gattungen gehören. Andererseits ist auch keine der beiden identisch mit *Scoliciosporum intrusum* (Th.Fr.) Hafellner, eine Vermutung, die in einigen rezenten Floren und Checklisten geäußert wird. *Lecidea intrudens* stellt eine cryptothalline lichenicole *Carbonea*-Art dar und ist identisch mit *C. halacsyi* sensu Hafellner & Sancho. *Lecidea halacsyi* Steiner ist ebenfalls endocapylisch, gehört allerdings nicht zu *Carbonea*. Die generische Zugehörigkeit von *Lecidea halacsyi* bleibt vorerst unklar. Von beiden Arten wird eine detaillierte Beschreibung verfasst. Die neue Kombination *C. intrudens* (H.Magn.) Hafellner wird vorgeschlagen. Für *Lecidea halacsyi* Steiner wird ein Lectotypus festgelegt. Insgesamt sind zur Zeit fünf fertile, lecideoide lecanorale Schlauchpilze bekannt, die imstande sind, Arten von *Rhizocarpon* subgen. *Rhizocarpon* zu besiedeln. Diese sind teilweise lichenisiert und besitzen einen gut entwickelten Thallus, teilweise parasitisch/parasymbiotisch und dann ohne sichtbaren Thallus. Ein Bestimmungsschlüssel für lecideoide lecanorale Pilze, die gelbe *Rhizocarpon*-Arten besiedeln, wird vorgelegt.

Key Words: Ascomycotina, Lecanorales, lichenicolous fungi, taxonomy

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1. Introduction

For a long time lecideoid lichenicolous fungi have been classified in *Nesolechia* (VOUJAX 1913, KEISSLER 1930). With the improvement of the knowledge about the taxonomy of *Lecidea* and superficially similar genera, a basis for a critical restudy of the lichenicolous lecideoid taxa was laid, resulting in some astonishing insights, including the following:

- *Lecidea* s. str. is a genus relatively poor in lichenicolous species, all of these are lichenized (see e.g. HERTEL 1995).
- *Nesolechia* s. str. is a genus relatively poor in species and infraspecific taxa, all of them are lichenicolous. By some mycologists the genus is merged with *Phacopsis* (see e.g. TRIEBEL & RAMBOLD 1988, TRIEBEL et al. 1995).
- Several further lecideoid genera have their own evolutionary lineages towards lichenicolous growth, including *Carbonea*, *Lecidella*, *Rimularia*, *Miriquidica* (see e.g. HERTEL & RAMBOLD 1987, 1990)
- With *Cecidonia* a further entirely lichenicolous species group could be distinguished on generic rank (TRIEBEL & RAMBOLD 1988).
- Some lecideoid lichenicolous species have been recognized as members of primarily non-lecideoid genera, e.g. *Scoliciosporum* (HAFELLNER 2004).

For a considerable number of species with lecideoid apothecia it has been shown that they belong to *Carbonea*, including both lichenized and cryptothalline/?parasymbiotic taxa. *Carbonea* was first established on the rank of subgenus (HERTEL 1967) and later raised to genus level (HERTEL 1983). The lichenized, non-lichenicolous *Carbonea atronivea* (Arnold) Hertel is the type species. Soon it became evident that some lichenicolous lecanoralean fungi also belong to *Carbonea*, the first ones transferred here were the widely distributed and well known *Carbonea vitellinaria* (Nyl.) Hertel and *C. supersparsa* (Nyl.) Hertel (HERTEL 1983).

Carbonea species play also a role as invaders of yellow-green *Rhizocarpon* taxa (see e.g. RAMBOLD & TRIEBEL 1992). Two of them are lichenized. The widely distributed but rare *Carbonea assimilis* (Körb.) Hafellner & Hertel [in Wirth] is relatively well known as a non host-specific invader of silicicolous, crustose lichens, including *Rhizocarpon geographicum* (HERTEL 1969: 324, sub *Lecidea assimilis*). A further lichenicolous lichen taxon was recognized as belonging to *Carbonea* by ANDREEV (2003), i.e. *Carbonea invadens* (H.Magn.) Andreev. This species, which at least starts its development on *Rhizocarpon geographicum*, is so far only known from arctic Russia.

Beside these evidently lichenized *Carbonea* species, also infections by cryptothalline (non-lichenized parasitic/parasymbiotic) lecanoralean lecideoid fungi have been found on yellow *Rhizocarpon*s and have regularly been reported in recent times. Although the occurrence of such infections is known for a long time (e.g. STEINER 1894, MAGNUSSON 1946) the taxonomy of the involved species was not clear so far. In attempts to determine such specimens mainly two names (and their nomenclatural synonyms) have been used, *Carbonea intrusa* or *Carbonea halacsyi*. The former recently has been recognized as belonging to *Scoliciosporum* (HAFELLNER 2004). The application of the latter name remained unclear.

A critical reinvestigation of relevant specimens, as well as a comparison with type specimens and with representative specimens of similar species has shown that, beside

Scoliosporum intrusum, two further species belonging to two different genera are involved, one *Carbonea* and one species of unclear relationship. Although a *Carbonea* monograph has been announced by Knoph et al. several times since more than one decade (e.g. in RAMBOLD & TRIEBEL 1992), it seems to be justified to publish our own results of this peculiar group of species, as the author is responsible for the repeated use of one of the specific names, which turned out to be wrong, and because some synonymisations have been published in recent years by the colleagues in Munich and other lichenologists at various occasions (KNOPH et al. 2004, RAMBOLD & TRIEBEL 1992, SANTESSON 1993, SANTESSON et al. 2004), which in the opinion of the author are wrong, too.

2. Material and methods

Dried herbarium specimens cited together with the treatments of the species have been examined. External morphology was studied with a dissecting microscope (WILD M3, 6,4x - 40x), anatomical studies of the thallus and the ascomata were carried out under the light microscope (LEICA DMRE, 100x–1000x). Sectioning was performed with a freezing microtome (LEITZ, sections of 12–15 mm) but squash preparations were also used, especially for ascus analysis. Preparations were mounted in water. When necessary, contrasting was performed by a pretreatment with lactic acid-cotton blue (MERCK 13741). Amyloid reactions in hymenia were observed both progressively and regressively by the use of Lugol's reagent (MERCK 9261). Sections and squash preparations were not pretreated with KOH (K), unless otherwise stated. Measurements refer to dimensions in tap water.

Secondary chemistry of non-crystallized apothecial pigments was tested according to MEYER & PRINTZEN (2000) and the nomenclature there proposed is applied.

Abbreviations for institutional herbaria follow HOLMGREN et al. (1990). Abbreviations of author names are those proposed by BRUMMITT & POWELL (1992).

The following selected specimens have been used for comparison:

Adelolecia pilati (Hepp) Hertel & Hafellner

Austria: Steiermark, [Steirisches Randgebirge], „Lavanttaler Alpen“, Koralpe, Handalpe N über der Weinebene, 1750–1850 m, GF 9156/3, freistehende Felsen (sog. „Öfen“), 2. VIII. 1986, leg. J. Poelt & C. Roux (GZU). - Steiermark, Steirisches Randgebirge, Koralpe, am Rücken Moserkogel – Glashüttenkogel E der Handalpe, NE über Glashütten, 1730–1750 m, GF 9156, Gneisfelsen, 7. XI. 1992, leg. J. Poelt (GZU). - Steiermark: Niedere Tauern, Schladminger Tauern, Pleschnitzzinken SW von Gröbming, am Gipfel, ca. 2110 m, 47°22'25"N / 13°51'25"E, GF 8649/1; NW-exponierte Schieferschrofen, 2. IV. 1985, leg. J. Hafellner no. 13037 (GZU). - Kärnten: Kreuzeck-Gruppe, Knoten Berg NE vom Hochtristenhaus, S-seitige Abbrüche, [46°46'50"N / 13°06'45"E], 2150–2210 m, GF 9244/2, 15. VII. 1978, leg. J. Poelt (GZU). - **Italy:** Südtirol: [Zentralalpen, Ötztaler Alpen], Langtaufferer Tal E des Reschenpasses, E von Melag, 1920 m, Fe-hältige Blöcke, 18. IV. 1984, leg. J. Hafellner no. 12400 (GZU).

Carbonea aggregantula (Müll.Arg.) Diederich & Triebel (all on *Lecanora polytropa*)

Austria: Steiermark: Niedere Tauern, Schladminger Tauern, Anstieg vom Hauser Kaibling auf den Hohenstein, S von Haus/Ennstal, S-Abhänge knapp unter dem Gipfel, ca. 2450 m, [47°20'45"N / 13°47'30"E, GF 8648/4], 8. X. 1977, leg. J. Hafellner no. 3424 & E. Wind (GZU). - Kärnten: Nationalpark Hohe Tauern, Schober-Gruppe, hinterstes Gradental W von Döllach, Umgebung der Ad. Noßberger Hütte, ca. 2500 m, GF 9042/2, auf Gneisschrofen, 8. VII. 1988, leg. J. Hafellner & M. Walther (GZU). - **Italy:** Trentino-Alto Adige, prov. Trento, Southern Alps, Dolomiti, Passo di Rolle N of San Martino di Castrozza, northern slopes of the mountain Tognazza, 46°17'20–25"N / 11°47'05–

15"E, ca. 2100 m; low outcrops of siliceous rocks in subalpine pastures, on inclined rock faces exposed to the N, 1. IX. 2002, leg. J. Hafellner no. 61136 (GZU).

Carbonea assimilis (Körb.) Hafellner & Hertel

Austria: Salzburg, Lungau, Niedere Tauern, Radstädter Tauern, Aufstieg vom Großeck zum Speiereck, W von Mauterndorf, ca. 2000 m, Kalkschiefer, auf *Tephromela atra*, 22. VII. 1982, leg. J. Hafellner no. 9947 (herb. Hafellner). - **Spain:** Prov. Madrid, Sierra de Guadarrama, SE vom Puerto de los Cotos, 2150 m, Felsköpfe an einem Geländegrat aus Gneis, auf *Lecidea lapicida* var. *pantherina*, 8. IX. 1980, leg. J. Hafellner no. 10897 (GZU).

Carbonea supersparsa (Nyl.) Hertel (all on *Lecanora polytropa* if not otherwise stated)

Austria: Tirol, Osttirol, Nationalpark Hohe Tauern, Glockner-Gruppe, E ober Kals, am Steig von der Niggalm zum Peischlachtörl, ca. 2300 m, GF 8942/3, 47°00'50"N / 12°42'40"E; S-exponierte Hänge mit alpinen Matten mit kleinen Schrofen, auf Glimmerschieferschrofen (teilweise Ca-hältig), 17. VII. 1997, leg. J. Hafellner no. 47097 (herb. Hafellner). - Salzburg: Hohe Tauern, Hüttwinkl Tal S von Rauris, Kolm-Saigurn am Nordfuß des Sonnblicks, ober dem Ammererhof, ca. 1650 m, 27. V. 1978, leg. J. Hafellner no. 3395 (herb. Hafellner). - Salzburg: Niedere Tauern, Schladminger Tauern, Lungau, SW-seitige Abbrüche der Zinkwand, im Bereich des W-Endes des Erzganges, 47°16'10"N / 13°40'55"E, ca. 2300 m, GF 8748/1; Steilabbrüche erzhaltigen Gesteins, auf steilen Neigungsflächen, auf *Lecanora soralifera*, 6. VII. 1995, leg. J. Hafellner no. 50385 & M. Möslinger (GZU). - Steiermark: Gurktaler Alpen, Frauenalpe S von Murau, Zwergstrauchheiden und Schieferblöcke am Oberberg, [47°04'30"N / 14°09'20"E], 1750–1800 m, GF 8950, 18. VI. 1978, leg. J. Hafellner no. 3399 (GZU). - **Portugal:** Beira Baixa, Serra da Estrêla, an der Straße von Manteigas nach Covilhã, N von Penhas da Saúde, ca. 1600 m, auf einem Silikatblock, 22. IX. 1983, leg. F. Brunner, ex herb. Hafellner no. 10808 (GZU). - **Italy:** Trentino-Alto Adige, prov. Trento, Southern Alps, Dolomiti, Passo di Rolle N of San Martino di Castrozza, northern slopes of the mountain Tognazza, 46°17'20–25"N / 11°47'05–15"E, ca. 2100 m; low outcrops of siliceous rocks in subalpine pastures, on inclined rock faces exposed to the N, 1. IX. 2002, leg. J. Hafellner no. 61133 (GZU).

Carbonea vitellinaria (Nyl.) Hertel (all on *Candelariella vitellina* coll.)

ERUOPE, Austria: Tirol: Osttirol, Nationalpark Hohe Tauern, Venediger-Gruppe, Innergschloß NW von Matrei, kurz E vom Venedigerhaus, am orographisch linken Ufer des Gschloß Baches, ca. 1690 m, 47°07'35"N / 12°27'40"E, GF 8840/4; Blöcke in einer subalpinen Weide, auf Neigungsflächen von Glimmerschieferblöcken, 4. IX. 1998, leg. J. Hafellner no. 46665 (GZU). - Salzburg: Nationalpark Hohe Tauern, Ankogel Gruppe, Greilkopf, knapp N unter dem Westgrat, E ober der Hagener Hütte, 47°01'30"N / 13°05'50"E, 2500 m, GF 8944/4; alpine Matten über Glimmerschiefer, auf niederen Glimmerschieferschrofen, 27. VIII. 1994, leg. J. Hafellner no. 33005 (GZU). - Kärnten: Hohe Tauern, Kreuzeck Gruppe, bei der Gerbershütte, ca. 2350 m, auf Grünschiefer, 2. XI. 1986, leg. W. Petutschnig (GZU). - Kärnten: Karnische Alpen, Bergmassive SW von Kötschach-Mauthen, kurz N unter dem Giramondopaß am Abstieg zur Oberen Wolayer Alm, ca. 1900 m, 46°37'45"N / 12° 50'05"E, GF 9343/3; alpine Matten mit zerstreuten Schieferblöcken, an Neigungsflächen, 15. VII. 1998, leg. J. Hafellner no. 45784 (GZU). - Steiermark, Steirisches Randgebirge, Koralpe, Bärental Alm, ca. 1700 m, GF 9155/4, Silikatblöcke, 1. VIII. 1989, leg. M. Matzer no. 103 et al. (GZU). - Burgenland, [Bernsteiner Gebirge], Wenzelanger-Sattel zwischen Bernstein und Redlschlag, Steinstückel, 720–820 m, GF 8563, Serpentin / Föhrenmischwald, 24. VI. 1984, leg. J. Poelt (GZU). - **Italy:** Piemonte, Prov. Cuneo: Alpi Cozie, crest SW above Colle dell' Agnello, 44°40'55"N / 06° 58'35"E, ca. 2830 m; outcrops of calcareous schists on steep slope exposed to the SE, on banks of calcareous schist, 25. VII. 2000, leg. J. Hafellner no. 59429 (herb. Hafellner). - [Friuli-Venezia Giulia], Prov. Udine, [Südalpen], Karnische Alpen, Mt. Crostis N von Comeglians, am Grat W vom Gipfel, ca. 2240 m; alpine Matten und Schrofen, auf niederen Silikatschrofen, 17. VIII. 1994, leg. J. Hafellner no. 36794 (GZU). - **ASIA, Turkey:** [Eastern Anatolia, Agri prov.], Südfanke des Ararat, über Ganikor-Su, in der Nähe von Dogubayazit, 2900 m, VIII. 1969, leg. T. Schauer (GZU). - **Syria:** Südsyrien, Dschebel Arab, ca. 1700 m, 1989, leg. H. Pözl (GZU). - **NORTH AMERICA, U.S.A.:** Colorado, Clear Creek Co., summit of Squaw Mountain SSE of Idaho Springs, 39°41'N / 105°29'30"W, siliceous rocks, 5. IX. 1977, leg. R. Anderson & J. Poelt (GZU).

Scoliosporum intrusum (Th.Fr.) Hafellner

See Hafellner (2004)

Toninia episema (Nyl.) Timdal (on *Aspicilia calcarea* coll. if not otherwise stated)

EUROPE, France: Dept. Sarthe, Alpes Mancelles-Sud, S von Alençon, SW von Fresnay-sur-Sarthe an der D 310, Kalkfelsen im Propriété Hiron, ca. 100 m, 11. VII. 1980, leg. J. Hafellner no. 8678 (herb. Hafellner). - Dept. Var, SW von la Cadière-d'Azur, ca. 3 km N der Straße von Bandol nach La Ciotat, 180 m, Kalk, 14. V. 1980, leg. J. Hafellner no. 8358 (herb. Hafellner). - Dept. Bouches-du-Rhône, Massif de la Sainte Baume, Col de l'Espigoulier NE von Aubagne, 720 m; Garrigue über Kalk, 11. V. 1980, leg. A. Bellemère & J. Hafellner no. 8547 (herb. Hafellner). - **Italy:** Toscana, Prov. Pisa, Monte Pisano, unterste W-exponierte Hänge SE von S. Giuliano Terme bei der Ortschaft Asciano, ca. 20 m, Kalk, 28. X. 1978, leg. J. Poelt (GZU). - Toskanischer Archipel, Insel Elba, Mittel-Elba, Monte Orello N von Lacona, S-exponierte Kalkfelsen in Macchie, 100–250 m, 28. VIII. 1982, leg. H. Mayrhofer no. 3952 (GZU). - Ligurien, oberhalb von Laigueglia, ca. 100 m, auf Flyschmergel, 24. IV. 1963, leg. M. Steiner (GZU). - Basilicata, Prov. Potenza, Trockenhänge ca. 2,5 km E der Autobahnausfahrt Lauria Sud, E vom Autobahntunnel, ca. 800 m, Kalk, 3. VI. 1979, leg. J. Hafellner no. 4699 (GZU). - **Croatia** („Jugoslawien“): Dalmatien, Insel Korčula, unweit des Hotels Repos SE der Stadt Korčula, niedrige Kalkfelsen, VIII. 1969, leg. J. Poelt no. 7409 (GZU). - Dalmatien, zwischen Zadar und Posedarje, am W Ortsrand von Murvica, 80 m, Kalk, 9. VI. 1973, leg. G. Zehetleitner (herb. Hafellner). - **AFRICA, Tunisia:** Halbinsel Bon, N von Korbous bei Ain Atrous, Felshänge an der Straße, 18. IV. 1982, leg. J. Poelt (GZU). - **Canary Islands:** Lanzarote, El Charco, 7–8 km NE of Arrecife, on *Aspicilia* spec., 24. XII. 1979, leg. R. Santesson no. 29986 (UPS). - Tenerife, Teno-Gebirge, NW unter Teno Alto am Steig hinab zur Nordküste, hoch oberhalb von Las Casas (kurz E der Punta de Teno), 18°21'05"N / 16°54'20"W, ca. 400 m; Vulkanitschrofen im Sukkulentenbusch, auf Neigungsflächen von Basaltfelsen, auf *Aspicilia* spec., 16. XII. 1998 bzw. 26. IV. 2005, leg. J. Hafellner no. 64240 (herb. Hafellner).

3. Results

Lecidea halacsyi J.Steiner, Denkschr. Akad. Wiss. Wien, math.-nat. Cl., 61: 529 (1894).

Syn.: *Nesolechia halacsyi* (J.Steiner) J.Steiner, Sitzungsber. Akad. Wiss. Wien, math.-nat. Cl., 107, 1. Abt.: 155 (1898). - *Carbonea halacsyi* (J.Steiner) Hafellner & Sancho, Herzogia 8: 365 (1990) non *Carbonea halacsyi* sensu Hafellner & Sancho.

Typus: Graecia, Peristeri, 1894, leg. Halacsy (W-lectotype)! Lectotype designated here.

Note: Together with the protologue, two collections originating from two localities are mentioned. The protologue itself includes characters of both of these two collections. Of these two collection sites, two specimens – both of the locality “Peristeri” – could be located in W. The two specimens are labeled as “typus”. No specimen of *Lecidea halacsyi* from the locality named “Kyllene” could be traced in W (U. Passauer, in litt.). Therefore one of the samples from “Peristeri” (specimen with the acquisition number 19347) is selected as lectotype. The other one (acquisition number 19379) most likely is a duplicate, as seen from the rock type and the morphotype of the host lichen, and therefore probably represents an “isolectotype”. See also the remarks below!

Icon.: Fig. 1 in this publication (longitudinal section of apothecium), Fig. 3a in this publication (ascus stained with Lugol's solution)

Exs.: -

Description (from STEINER 1894 and own observations): **Biology:** Lichenicolous. Infection marked by the presence of apothecia on the narrow prothallus stripes between host areolae, mostly without visible damage to the host, but here and there host areolae adjacent to apothecia somewhat bleaching. **Thallus** not discernable from the outside,

vegetative hyphae c. 3–5 µm in diam., extruding from the apothecia and penetrating the dark plectenchyma below the apothecia, I(Lugol)– and therefore distinguishable from hyphae of the host. **Apothecia** not agglomerated, often arranged in rows along the fissures between the areolae of the host, black, dull, with flat to slightly convex discs, most apothecia with visible margin, 0.2–0.4 mm in diam.; **exciple** composed of radiating hyphae forming an amphithecium, without medullary layer, intensely pigmented, pigments deposited in the intercellular spaces, outer zone green-black, inner zone dark red-brown, together c. 40–50 µm thick; **hypothecium** pale throughout, brownish in the upper part, c. 100–150 µm high; **hymenium** hyaline to brownish (colour resulting mainly from old asci), c. 50–55 µm high; **epihymenium** blue-green-black, for reactions see below. **Asci** clavate, of *Bacidia*-type, that is with an euamyloid tholus provided with an ocular chamber and a non-amyloid conical central body, 8-spored, 35–45 x 10–15 µm (excluding the gelatinous caps). **Paraphyses** c. 50–55 µm long and c. 2–3 µm thick, mostly unbranched and without anastomoses, conglutinated, paraphysal cells relatively short, terminal cells slightly enlarged and surrounded by blue-green pigment (Pigmenthauben sec. KILIAS 1981). **Ascospores** hyaline, non-septate, ellipsoid to almost oblong, non-halonate (perispore not discernable in LM), 8–12 x 3–5 µm (9–16 x 4–6 µm sec. STEINER 1894), length-width-ratio about 2,5–2,9–3,3. **Pycnidia** not observed.

Secondary chemistry: Not tested with TLC, no crystals visible in polarized light; vegetative hyphae I(Lugol)–; ascial wall I(Lugol)+ blue (outermost layer and tholus), hymenial gel I(Lugol)+ blue, turning red-brown at higher concentration; inner zone of exciple, upper part of hypothecium, and hymenium K+ purple, N+ orange-brown (atra-red sec. MEYER & PRINTZEN 2000); outer zone of exciple and epihymenium K+ dark blue-green, N+ purple-violet (cinereorufa-green sec. MEYER & PRINTZEN 2000).

Hosts: On the thallus of *Rhizocarpon geographicum*

Distribution: The species is so far known only from two mountain ranges in Greece. The records so far known indicate a meridional-oromediterranean distribution pattern, but data are still too scarce for a decision on this matter.

Earlier records: STEINER (1898: 53–54, sub *Nesolechia halacsyi*) mentions a third locality in Greece (Oeta, leg. Nider), however the corresponding specimen could not be traced in W (Passauer, in litt.). VOUAUX (1913) only repeats the data given by the describer. Records of *Carbonea halacsyi* from 1990 onwards from various countries, mainly by the author, refer to *Carbonea intrudens* (see below).

Remarks:

“*Lecidea*” *halacsyi* is certainly not a member of *Lecidea* s. str. and evidently does not belong to *Carbonea* either, which was the first guess (HAFELLNER & SANCHO 1990). *Carbonea* species are easily distinguished by their asci of *Lecanora*-type and *Lecidea* species are provided with *Lecidea*-type asci (HAFELLNER 1984).

Lecideoid lecanoralean fungi with *Bacidia*-type asci are so far arranged in the genera *Adelolecia* and *Calvitimela* (by some authors regarded as belonging to *Tephromela*). However, none of these genera seems to be an adequate solution for this taxonomic problem.

Arguments for an inclusion in *Adelolecia* would be its asci of *Bacidia*-type combined with non-septate ascospores and the presence of certain non-crystallized apothecial pigments, *Lecidea*-Grün (cinereorufa-green sensu MEYER & PRINTZEN 2000) and *Lecanora*-Rot (atra-red sensu MEYER & PRINTZEN 2000). But as all known *Adelolecia* species have predominantly blue-green hyphal pigments in the outer exciple

(without an inner zone pigmented with atra-red) and lichenicolous behaviour so far is not known in that genus, we hesitate to combine the species into *Adelolecia*.

Regardless of ascospore septation, a closer relationship with *Toninia episema* (Nyl.) Timdal (syn. *Catillaria e.*, *Scutula e.*) seemed possible. For this species and a few others HAFELLNER (1984) had proposed the genus *Kiliasia*, which TIMDAL (1991) included in *Toninia* later on. In fact, spores of some *Toninia* species remain non-septate for a relatively long time, but finally they usually become at least 1-septate. In the generic description TIMDAL (1991: 31) gives the spores as simple to 7-(9)-septate. Simple to 1-septate ascospores are typical for e.g. *Toninia himalayana* Timdal and *T. tristis* (Th.Fr.) Th.Fr. In *Toninia* also parasitism is relatively frequent, although this behaviour is often overlooked, especially when the *Toninia* itself is lichenized. In most cases the host species are lichenized with cyanobacteria, but there are also exceptions, e.g. *T. aromatica*, which grows on a range of lichens lichenized with coccal green algae. Several *Toninia* species, however, are regular parasites without a lichenized thallus. Their hosts are also lichenized either with cyanobacteria (e.g. *Degelia plumbea* in *T. plumbina* (Anzi) Hafellner & Timdal, *Collema multipartitum* in *Toninia collematicola* Timdal) or with coccal green algae (e.g. *Aspicilia calcarea* agg. in *T. episema*, species of *Lecanora subfusca*-group in *T. subfuscae* (Arnold) Timdal). Arguments against an inclusion of this species in *Toninia* are, beside the permanently non-septate ascospores the apothecial pigments (none of the *Toninia* pigments as defined by MEYER & PRINTZEN 2000 is present, but pigments unknown in *Toninia* occur), the paraphyses not easily separated in squash preparations, and – from the ecological point of view – the very acid substrate, because most of the *Toninia* species grow on calcareous rocks and soils. However, concerning the substrate preferences, there are some exceptions, e.g. *T. bullata* and *T. ruginosa*, which grow also on acidic rocks (TIMDAL 1991: 20). As "*Lecidea*" *halacsyi* is a lichenicolous species with reduced thallus, the pH of the substrate might be of minor importance, as in the case of *Toninia episema*, which was also found on *Aspicilia* taxa growing upon volcanic rocks.

For some cryptothalline lecideoid species, including *Lecidea campestricola* Nyl. and *Nesolechia cerasina* Müll.Arg., a relationship with *Tephromela atra* was postulated (RAMBOLD & TRIEBEL 1992, RAMBOLD 1993) thus they were interpreted as a lecideoid, lichenicolous branch in a typically lecanoroid lichenized genus. However, of *Tephromela* we have a narrower and in our opinion more natural concept, which excludes at least the majority of lecideoid species ever placed in that genus. For the *Lecidea armeniaca* group the genus *Calvitimela* was introduced (HAFELLNER & TÜRK 2001). Possibly these species will prove to be more closely related, although it is not very likely.

Other lecanoralean lecideoid genera including lichenicolous species, such as *Phacopsis*, *Rimularia*, and *Cecidonia* do exhibit other character states in ascus structure, excipulum texture as well as in colour and reactions of non-soluble pigments impregnating parts of the apothecia. Therefore they were not taken into consideration for a more natural placement of "*Lecidea*" *halacsyi*.

Thus, for the time being, the affinities of "*Lecidea*" *halacsyi* on genus level remain unclear.

As already mentioned, STEINER (1894) in the protologue has pointed out some differences between the two specimens which are also indicated in the diagnosis. So the specimen from Peristeri should have a darker hypothecium and hymenium and the hymenium is said to give a slightly different iodine reaction than the one from Kyllene. As no material from Kyllene was available, it remains unclear, whether this falls within the range of modification or possibly the two collections belong to different taxa. With the characters given for the Kyllene collection it is at least evident that it cannot belong to *Carbonea intrudens* (see below).

On the lectotype specimen also small thalli of *Candelariella vitellina* and traces of other, undeterminable lichens are present. However, the distribution of the *Carbonea* apothecia clearly indicates that the host is the *Rhizocarpon* and not the *Candelariella*, nor another lichen species. A more thorough investigation of the apothecial characters confirms that the lichenicolous fungus is not *Carbonea vitellinaria* but a different species.

At an earlier occasion (HAFELLNER & SANCHO 1990) we had given "Kyllene" as the type locality. This was done without a reexamination of authentic material. The need of a lectotypification was not indicated. As no herbarium was indicated, in which the type material is conserved, this "typification" is invalid under the rules of the code (ICBN 9.20).

Steiner (l.c., all sub *Lecidea*) has compared his species with *Carbonea supersparsa* but not with *C. aggregantula*, a species not mentioned by Steiner. *Carbonea halacsyi* sensu Hafellner & Sancho is in fact not very similar to *C. supersparsa* but shows similarities with *C. aggregantula*. Therefore some doubts remained whether both Steiner and we had the same species in our hands or not.

The reinvestigation of the type has revealed that the species described by Steiner and the *Carbonea* which we reported from a number of localities in Europe under the name *Carbonea halacsyi*, are not conspecific. Therefore *Carbonea halacsyi* (Steiner) Hafellner & Sancho is a nomenclatural synonym of the species treated here under its original name. On the other hand we were in need of a name for *Carbonea halacsyi* sensu Hafellner & Sancho. Fortunately, it needs not to be described as new, because this species was already described by MAGNUSSON (1946) as *Lecidea intrudens* H.Magn., and *Carbonea intrudens* is the correct name for it. See below!

For characters separating the lichenicolous endokapylic (cryptothalline) lecideoid species growing on *Rhizocarpon* subgen. *Rhizocarpon* from each other and both species from the epikapylic *Scoliciosporum intrusum* see HAFELLNER (2004) and below (in the text and table 1).

Having also flat apothecia, "*Lecidea*" *halacsyi* is morphologically similar to *Carbonea supersparsa* (a cryptothalline lichenicolous species mainly on species of the *Lecanora polytropa* group) and *C. vitellinaria* (a cryptothalline lichenicolous species on saxicolous populations of species of the *Candelariella vitellina* group). "*Lecidea*" *halacsyi* can be distinguished from both *Carbonea* species e.g. by its *Bacidia*-type asci.

KEISSLER (1920, 1930, sub *Nesolechia*) regarded the species as identical with *Lecidea verrucariae* Nyl., an opinion neither followed by consecutive mycologists nor in this publication. *Lecidea verrucariae* is now placed in the genus *Toninia* (RAMBOLD & TRIEBEL 1992: 170).

Further specimens seen: Greece: same locality as lectotype probably representing an isolectotype, on *Rhizocarpon geographicum* (W).

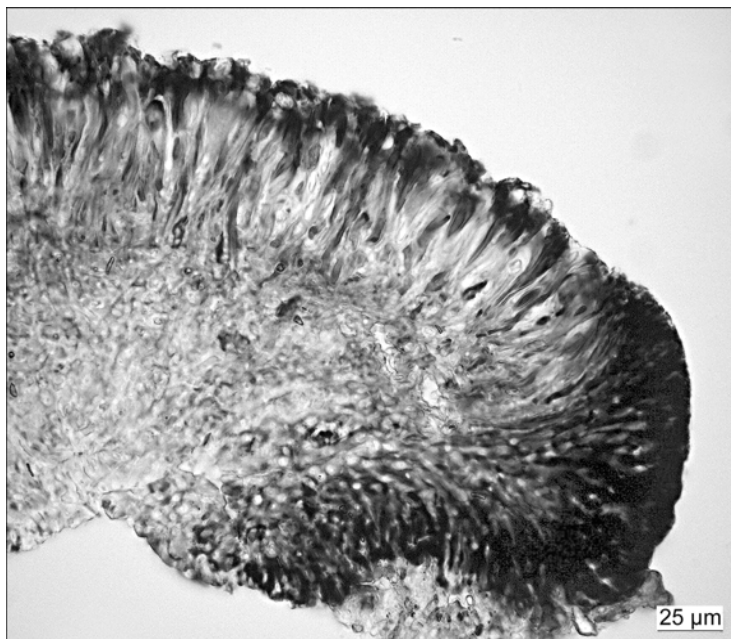


Fig. 1: "*Lecidea*" *halacsyi*: cross section of apothecium, unstained (from lectotype, phot. J. Hafellner)

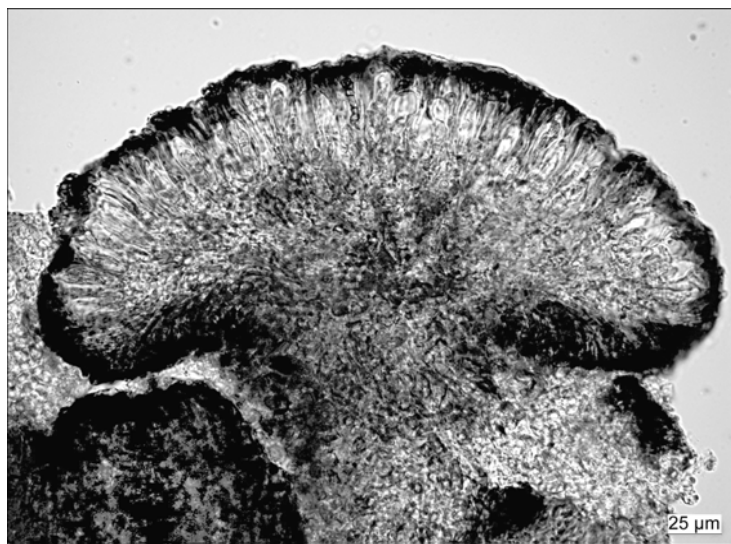


Fig. 2: *Carbonea intrudens*: cross section of apothecium, unstained (from Hafellner 24253, phot. J. Hafellner)

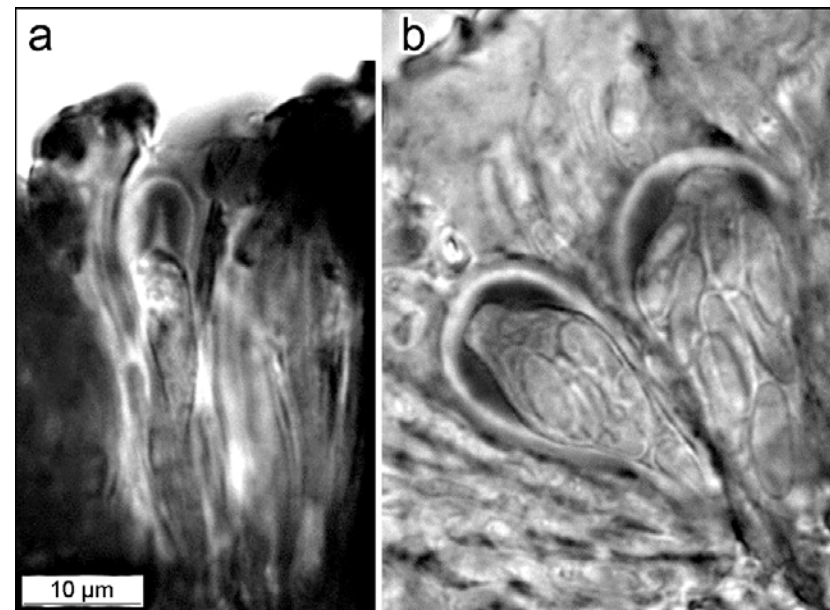


Fig. 3: a) "*Lecidea*" *halacsyi*: immature ascus, stained with I(Lugol) (from lectotype, phot. J. Hafellner). – b) *Carbonea intrudens*: mature asci, stained with I(Lugol) (from Hafellner 62306, phot. J. Hafellner)

Carbonea intrudens (H.Magn.) Hafellner comb. nov.

Bas.: *Lecidea intrudens* H.Magn., Ark. Bot. 33A(1): 53 (1946).

Typus: Sweden, Lycksele Lappmark, Stensele, Sandvik, 400 m, among boulders in the wood, upon *Rhizocarpon geographicum*, 2. VII. 1924, leg. Magnusson no. 7706 (UPS-holotype)!

Syn.: *Carbonea halacsyi* sensu Hafellner & Sancho non *Lecidea halacsyi* J.Steiner

Icon.: Hertel 1970: 408 fig. 9 (drawing of longitudinal section of apothecium); fig. 2 in this publication (longitudinal section of apothecium), fig. 3b in this publication (asci stained with Lugol's solution)

Exs.: -

Description (from MAGNUSSON 1946, HERTEL 1970 and own observations): **Biology:** Lichenicolous. Infection marked by tiny black areas on host areolae or without visible damage on the prothallus. **Thallus** not discernable from the outside, present as a plectenchymatic cushion below the apothecia, vegetative hyphae visible below the apothecia in longitudinal section, brown but pigmentation fading further down, forming a dense tri-dimensional net, c. 5–7 μm in diam., I(Lugol)–, (acc. to MAGNUSSON, l.c., proper thallus verruciform, up to 150 μm thick, inside a mixture of brownish lumps, containing yellowish-green algal cells, 6–8 μm in diam.). **Apothecia** in small dense

groups on the edge of areolae of the host or on the prothallus in between, black, convex from the beginning, somewhat glossy, broadly attached, without distinct margin, 0,3–0,5 mm in diam., groups up to 1,5 mm in diam.; **exciple** dark brown, getting more intense to carbonized towards the outside, c. 30–45 µm across, at least when young exciple composed of radially arranged hyphae; **hypothecium** dark brown to brown, 50– 80 µm high, of intricate hyphae; **hymenium** hyaline, c. 40–50 µm high, in the upper half with bluish tinge verging to dull blue-green or emerald green in the uppermost zone (c. 10 µm) and forming an epihymenium. **Asci** clavate, of *Lecanora*-type, 8-spored, 25–35 x 11–14 µm (15–17 µm acc. to MAGNUSSON, l.c.). Some **paraphyses** unbranched or others with some branches and anastomoses, conglutinated, c. 2–2,5 µm in diam., with slightly enlarged tips, surrounded by blue-green pigment, tips embedded in pigmented gel, in the gel pigment of same type but less intensely coloured, I(Lugol)–. **Ascospores** hyaline, non-septate, old spores not rarely with one thin septum, ellipsoid to oblong, 8–12(–16) x 3,5–5 µm, length-width-index about 3, non-halonate, perispore not discernable in LM. **Pycnidia** not observed.

Secondary chemistry: Not tested with TLC, no crystals visible in polarized light; vegetative hyphae I(Lugol)-; ascus wall I(Lugol)+ blue (outermost layer and tholus); hymenial gel I(Lugol)+ blue turning red-brown with higher concentration; exciple and hypothecium K-, N+ vividly orange-brown (leptoclinoides-brown sec. MEYER & PRINTZEN 2000); epihymenium K+ vividly blue-green, N+ for a short time intensely blue, then purple-violet (cinereorufa-green sec. MEYER & PRINTZEN 2000).

Hosts: On various morphotypes of *Rhizocarpon geographicum*, sometimes treated as subspecific taxa, rarely also on other species of *Rhizocarpon* subgen. *Rhizocarpon*, e.g. *R. alpicola*

Distribution and earlier records: Up to the 1970ies the species was known only from the type locality (HERTEL 1970). In the meanwhile many further collections came to our knowledge but almost all of them have erroneously been published under other names. Data from the herbarium labels suggest a subarctic–boreal to meridional–oro- to cryomediterranean distribution pattern, at least in Europe. With certainty *C. intrudens* is so far known from Norway (HAFELLNER 1993, sub *C. halacsyi*), Sweden, Austria (BOOM et al. 1996, HAFELLNER 1991, 2000, 2002, HAFELLNER & SANCHO 1990, HAFELLNER & TÜRK 1995, HAFELLNER et al. 2004, HOFMANN et al. 1995, all sub *C. halacsyi*), Italy (TRETIACH & HAFELLNER 2000, sub *C. halacsyi*), and Spain (HAFELLNER & SANCHO 1990, sub *C. halacsyi*).

In North America it is known from Greenland (see below). A further record which might refer to this species originates from Canada (Alberta) (see BEDER & OGILVIE 1967, sub *Lecidea intrudens* on *Rhizocarpon geographicum*), but the corresponding specimen needs to be revised.

The species was erroneously reported from southern France (CLAUZADE & RONDON 1961, sub *Lecidea intrudens* on *Lecanora gangaleoides*), as already HERTEL (1970) has stated and as it is indicated by the host species mentioned. But a later record from France (Auvergne) (HOUMEAU & ROUX 1980: 98, sub *Lecidea aggregatula* (sic!) on *Rhizocarpon geographicum* agg.) may be correct.

Remarks:

The type of *Lecidea intrudens* has been reinvestigated by HERTEL (1970: 424). We also looked at it under the dissecting microscope to confirm the assumption that the type is identical with the other specimens cited below. However, as the type specimen is very tiny and a detailed description is given by HERTEL (1970), we did not make any further sections. Thus, own observations of anatomical characters included in the description given above refer to non-type material.

In recent times *Lecidea intrudens* has been mentioned among the synonyms of *Carbonea intrusa* (now *Scoliciosporum intrusum*) (see e.g. RAMBOLD & TRIEBEL 1992, SANTESSON et al. 2004). For distinguishing characters between *Carbonea intrudens* and *Scoliciosporum intrusum* see HAFELLNER (2004) and table 1.

ARNOLD (1876: 359, sub “*Lecidea* – (n. sp. videtur)”), accompanied by a description fitting quite well to *C. intrudens*) evidently was the first who recognized the presence of the species on *Rhizocarpon geographicum*. This first mention is based on a specimen from a locality in Northern Tyrol (Austria). Later the same author reported the species also from a locality now in Italy (Trentino) (ARNOLD 1880: 105). Both records are also included in the compilation by MAGNUS (1905: 356). However, as the specimens were not available to us, some uncertainty remains, if this our assumption is correct.

Interestingly, Lettau, who studied lichens from many different places in the Alps and also has investigated very carefully the lichenicolous taxa, did not mention any collection that might refer to *Carbonea intrudens* (LETTAU 1958).

With its convex, often aggregated apothecia *C. intrudens* is morphologically similar to *C. aggregatula* (a cryptothalline lichenicolous species mainly on species of the *Lecanora polytropa* group). *C. intrudens* can be distinguished from *C. aggregatula* by the conspicuous black basal cushion, on which the apothecia develop, and by the somewhat longer ascospores.

Furthermore, in order to avoid confusion, it is worth mentioning that Magnusson described also a *Lecanora intrudens* (MAGNUSSON 1942). This species has later been recognized as belonging to *Miriiquidica* (HERTEL & RAMBOLD 1987).

Lichenicolous fungi on *Carbonea intrudens*: In a collection from northern Italy (Hafellner 61134, see below) the hymenia at least partly have been found infested by *Intralichen christiansenii* (D.Hawksw.) D.Hawksw. & M.S.Cole.

Further specimens seen (all on *Rhizocarpon geographicum* if not otherwise indicated):

EUROPE: Austria: Tirol: Ötztaler Alpen, Glockturm-Kamm, Platztal E ober Pfunds, Grat zwischen dem Schönjöchel und dem Arzkopf, ober dem verfallenen Bergwerk, ca. 2800 m, GF 9029; teilweise Fe-reicher Schiefer und Rasenbänder, auf Schrofen an Steilflächen, 4. IX. 1991, leg. J. Hafellner no. 30300 (GZU). - Osttirol, Karnische Alpen, am Steig aus dem hintersten Obertillischer Tal auf den Hegetriegel, Klappalm, ca. 1900 m, GF 9341/1, [subalpine Weiden mit Baumgruppen und einigen Blöcken], auf teilweise Ca-hältigen Schieferblöcken, 8. IX. 1989, leg. J. Hafellner no. 28790 (GZU). - Osttirol, Nationalpark Hohe Tauern, Venediger-Gruppe, Innerschlöß NW von Matri, kurz E vom Venedigerhaus, am orographisch linken Ufer des Gschlöß Baches, ca. 1690 m, 47°07'35"N / 12°27' 40"E, GF 8840/4; Blöcke in einer subalpinen Weide, auf Neigungsfächen von Glimmerschieferblöcken, 3. IX. 1998, leg. J. Hafellner no. 46684 (GZU). - **Salzburg:** Gurktaler Alpen, E-Hänge der Friesenhals Höhe ober dem Rosanin See, [46°57'05"N / 13°46'35"E], ca. 2150 m, GF 9048/2; schrofendurchsetzte alpine Rasen, auf Schrofen aus einer silikatischen Breckzie, 14. VIII. 1989, leg. J. Hafellner no. 63954 & M. Magnes (GZU). - **Kärnten:** Nationalpark Hohe Tauern, Ankogel-Gruppe, Tauertal NW von Mallnitz, am Weg von der Jamnigalm auf die Hagener Hütte, 2100–2200 m, GF 8944/4, 28. VII. 1989, leg. J. Hafellner no. 24253 & R. Türk (herb. Hafellner). - Nationalpark Nockberge, Klomnock N von Bad Kleinkirchheim, am Nordgrat gegen die

Schiestelscharte, knapp unter dem Gipfel, [46°53'00"N / 13°47'20"E], ca. 2250 m, GF 9148/2; Glimmerschiefer, auf NW-exponierten Felsschrofen; 28. VIII. 1994, leg. J. Hafellner no. 33377 (GZU). - Nationalpark Nockberge, Stileck, ca. 30 m W/NW unter dem Gipfel, 46°52'30"N / 13°38'20"E, ca. 2170 m, GF 9147/2, Granat-Glimmerschiefer-Felsblock in alpinen Rasen, auf *Rhizocarpon alpicola*, 6. IX. 1989, leg. W. Petutschnig (GZU). - **Steiermark**: Niedere Tauern, Schladminger Tauern, E-Grat der Grobfeldspitze W oberhalb der Buckelkarseen, [47°17'15"N / 13°40'25"E], 2200 m, GF 8748/1; auf Gneisblöcken, 5. VII. 1989, leg. J. Hafellner no. 50357 (herb. Hafellner). - Niedere Tauern, Schladminger Tauern, Kleinsölk-Obertal, am Steig vom Schwarzensee zur Rettungsscharte, am Fuß der S-exponierten Abbrüche des Großen Gnasen, ca. 1940 m, 47°17'50"N / 13°50'50"E, GF 8749/1; Blockschutt, auf Neigungsflächen von Gneisblöcken, 8. IX. 1993, leg. J. Hafellner no. 50139 & M. Möslinger (herb. Hafellner). - Gurktaler Alpen, Kirbisch ca. 11 km SW von Murau, oberhalb von St. Lorenzen, NE-exponierte Hänge knapp unter dem Gipfel, 47°03'05"N / 14°03'05"E, ca. 2100 m, GF 8950/1; niedere Schrofen und Blockwerk aus paläozoischen Schiefen zwischen Zwergstrauchheiden, auf Neigungsflächen der Schrofen, 24. VIII. 2003, leg. J. Hafellner no. 62306 (GZU). - Ibid., auf Überhangsflächen der Schrofen, auf *Rhizocarpon spec.*, 24. VIII. 2003, leg. J. Hafellner no. 62330 (GZU). - Gurktaler Alpen, Eisenhut ESE von Turrach, SW-Rücken ober der Geißekühütte, 46°57'05"N / 13°55'05"E, ca. 2260 m, GF 9049/2; kleine Schutthalden eines vulkanogenen, paläozoischen Schiefers in lückigen Zwergstrauchheiden, auf kleinen Schieferplatten, 28. VII. 2002, leg. J. Hafellner no. 61500 (GZU). - Steirisches Randgebirge, Koralpe, Kleiner Speikkogel, N-Hänge kurz NW unter dem Gipfel, 46°47'05"N / 14°58'40"E, ca. 2080 m, GF 9255/2, Glimmerschieferschrofen in alpinen Rasen, auf N-exponierten Neigungsflächen, 29. X. 2000, leg. J. Hafellner no. 53177 & A. Hafellner (GZU). - Steirisches Randgebirge, Stubalpe W von Köflach, Schwarzkogel, im Gipfelbereich, 47°05'30"N / 14°52'05"E, ca. 1810 m, GF 8955/1, W-exponierte, niedere Schrofen aus Glimmerschiefer, auf Neigungsflächen, 15. VIII. 2002, leg. J. Hafellner no. 59808 (GZU). - **Italy: Piemonte, prov. Cuneo**: Alpi Cozie, crest SW above Colle dell' Agnello, 44°40'55"N / 06°58'35"E, ca. 2830 m; outcrops of calcareous schists on steep slope exposed to the SE, on banks of calcareous schist, 25. VII. 2000, leg. J. Hafellner no. 60264 (GZU). - **Trentino-Alto Adige, prov. Trento**: Southern Alps, Dolomiti, Passo di Rolle N of San Martino di Castrozza, northern slopes of the mountain Tognazza, 46°17'20"-25"N / 11°47'05"-15"E, ca. 2100 m; low outcrops of siliceous rocks in subalpine pastures, on inclined rock faces exposed to the N, 1. IX. 2002, leg. J. Hafellner no. 61115, 61134 (both in GZU). - **Emilia Romana, Prov. Reggio Emilia**: Apennino, Monte Ventasso S above the village Ramiseto, slopes exposed to N, SE above Lago Calamone, 44°22'55"N / 10°17'35"E, ca. 1450 m; scree of sandstone boulders, on inclined rock faces of sandstone boulders, 23. VII. 2001, leg. J. Hafellner no. 58371 (GZU). - **Makedonia**: Šar planina, Rudoka, Popova šapka W von Tetovo, Hänge W der Bergstation der Bergbahn, 1700-2300 m, 8. VII. 1977, leg. J. Hafellner no. 41469 (GZU). - **NORTH AMERICA: Greenland**: N. Greenland, area NE of Hiawatha Gletscher, 78°50'N / 67°18'W, on siliceous stones, 30. VII. 1999, leg. E. S. Hansen (separated from Lich. Groenlandici exs. 788) (GZU).

Locality data of specimens published under the name *Carbonea halacsyi* by the author at various occasions (see above) are not repeated here.

Distinguishing the *Carbonea* species and other lecanoralean fungi on yellow *Rhizocarpon* species

The three *Carbonea* species inhabiting yellow *Rhizocarpon* species are quite easy to distinguish, already under the dissecting microscope. *C. intrudens*, confined to this group of host species, forms agglomerated apothecia which are convex from the beginning and a margin is not discernable. Beside this endocapylid species also *Carbonea assimilis* and *Carbonea invadens* (H.Magn.) Andreev are sometimes reported as inhabiting *Rhizocarpon*. Both these species are lichenized and have a distinct thallus. Whereas the thallus of *C. assimilis* consists of pale-brown, convex, glossy areoles (HERTEL 1969), that of *C. invadens* is said to have greyish, flat areoles (ANDREEV 2003).

Character	<i>Scoliciosporum intrusum</i>	" <i>Lecidea</i> " <i>halacsyi</i>	<i>Carbonea intrudens</i>
Lichenized thallus	present in small patches, crustose, black but often with brownish tinge, fissured-areolate	absent	absent
Areolae	uneven to granular, each consisting of several to many dense thallus particles	absent	absent
Biological behaviour	autonomous, facultatively lichenicolous (?obligate youth parasite)	obligately lichenicolous (?parasymbiotic)	obligately lichenicolous (?parasymbiotic)
Shape of infection, arrangement of apothecia	small patches, sometimes fusing, apothecia scattered	apothecia +/- arranged in rows along the host areolae	apothecia in roundish agglomerations, often on the prothallus or near to host apothecia
Colour and shape of apothecia	blackish, often with greenish or brownish tinge, almost flat to medium convex	black, dull, plane to slightly convex, with thin but distinct margin	black, glossy, strongly convex from the beginning, immarginate
Colour and texture of excipulum	dull to brownish, of intricate hyphae	outer zone green-black, inner zone dark red-brown, excipular hyphae in radial arrangement	dark brown, getting more intense to carbonized towards the outside
Colour and reaction of epihymenial pigment	bluish-greenish to dull	blue-green-black, K+ dark blue-green, N+ purple-violet	dull blue-green or emerald green, K+ vividly blue-green, N+ for a short time intensely blue, then purple-violet
Colour of hypothecium	hyaline to pale-olive	pale throughout, brownish in the upper part	brown to dark brown
Paraphyses	branching and anastomosing, but hardly conglutinated	conglutinated, with few ramifications	conglutinated, with few ramifications and anastomoses
Asci	<i>Lecanora</i> -type	<i>Bacidia</i> -type	<i>Lecanora</i> -type
Ascospores	ellipsoid to fusiform, often somewhat asymmetric, non-septate with often several 1-septate intermingled, 12-17(-19) x 4-5,5(-6) µm	ellipsoid, non-septate, 8-12 x 3-5 µm	ellipsoid to oblong, non-septate, 8-12 (-16) x 3,5-5 µm

Tab. 1: Characters distinguishing among +/- cryptothalline lecideoid fungi upon *Rhizocarpon* subgen. *Rhizocarpon*

"*Lecidea*" *halacsyi* has flat apothecia with a persisting lecideine margin visible, and the apothecia do not develop in dense agglomerations but are arranged in rows along the edges of host areolae.

Beside the two cryptothalline lecideoid species, *Carbonea intrudens* and “*Lecidea*” *halacsyi*, four further lichens are regularly found upon *Rhizocarpon*: *Scoliciosporum intrusum*, *Rimularia furvella* and *Miriquidica intrudens*, in lower elevations also *Protoparmelia atriseda*. All these are more or less distinctly lichenized, and *Rimularia furvella* and *Miriquidica intrudens* are sorediate and usually sterile. The apothecia of *Protoparmelia atriseda* are brown and provided with a thalline margin. Thus, only *Scoliciosporum intrusum* can be called lecideoid. Apothecia of *S. intrusum* are blackish and more or less convex. An internally pale exciple, a hardly pigmented hypothecium, and anastomosing paraphyses are characteristic (HAFELLNER 2004).

Key to lecideoid lecanoralean fungi inhabiting taxa of *Rhizocarpon* subgen. *Rhizocarpon*

- 1 Thallus sorediate2
- 1* Thallus with apothecia4
 - 2 Thallus grey, soredia blackish **Miriquidica nigroleprosa**
 - 2* Thallus brown3
- 3 Thallus granular-sorediate throughout **Rimularia furvella**
- 3* Thallus consisting of small flat areolae provided with grayish margin
 - **Miriquidica intrudens**
 - 4 A thallus surrounding the apothecia is present (at least distinct under the dissecting microscope!)5
 - 4* Thallus indistinct7
- 5 Exciple in longitudinal section pale, brownish-greenish, paraphyses with anastomoses, ascospores often somewhat asymmetric
 - **Scoliciosporum intrusum**
- 5* Exciple in longitudinal section dark brown throughout, paraphyses hardly interconnected by anastomoses, ascospores symmetrically ellipsoid6
 - 6 Areolae pale brown, convex to even subsquamulose, glossy
 - **Carbonea assimilis**
 - 6* Areolae greyish, plane **Carbonea invadens**
- 7 Apothecia plane to subconvex, with thin margin when young, dull, arranged in rows along fissures between host areolae “**Lecidea**” **halacsyi**
- 7* Apothecia convex and immarginate from the beginning, glossy, aggregated in dense groups preferably on the prothallus or near host apothecia
 - **Carbonea intrudens**

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