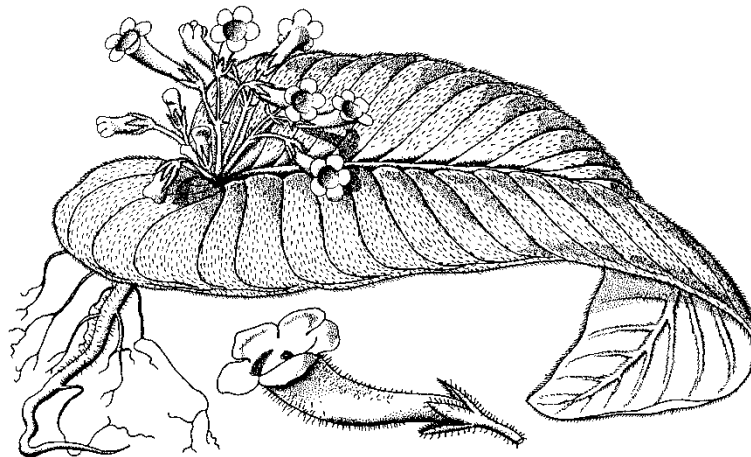


FRITSCHIANA

78



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

Walter OBERMAYER

Lichenotheca Graecensis, Fasc. 22 (Nos 421–440)

Josef HAFELLNER

Lichenicolous Biota (Nos 181–200)

Josef HAFELLNER

**Distributional and other data for some *Agonimia* species
(Verrucariales, lichenized Ascomycota)**

Peter Othmar BILOVITZ & Helmut MAYRHOFER

**Lichenized and lichenicolous fungi from the valley
'Ochsental' (Eastern Alps, Vorarlberg, Austria)**

Graz, 19. Dezember 2014

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: Karl Fritsch. - Berichte der Deutschen Botanischen Gesellschaft 51: (157)–(184) [mit Schriftenverzeichnis]. - KUBART B. 1935: Karl Fritsch. - Mitteilungen des Naturwissenschaftlichen Vereins für Steiermark 71: 5–15 [mit Porträt]. - TEPPNER H. 1997: Faszination versunkener Pflanzenwelten. Constantin von Ettingshausen - ein Forscherportrait. - Mitteilungen Geologie und Paläontologie am Landesmuseum Joanneum 55: 133–136. - Im übrigen vgl. STAFLEU F.A. & COWAN R.S. 1976, Taxonomic Literature 1: 892 und BARNHART J.H. 1965: Biographical Notes upon Botanists 2: 12.

Graz, November 1997

Herwig 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 (zwischenzeitlich auch auf 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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Umschlagsbild: *Carolfritschia 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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Lichenotheca Graecensis, Fasc. 22 (Nos 421–440)

Walter OBERMAYER*

OBERMAYER Walter 2014: Lichenotheca Graecensis, Fasc. 22 (Nos 421–440). - Fritschiana (Graz) 78: 1–7. - ISSN 1024-0306.

Abstract: Fascicle 22 of 'Lichenotheca Graecensis' comprises 20 collections of lichens from the following countries (and administrative subdivisions): Austria (Carinthia; Lower Austria; Salzburg; Styria; Upper Austria), Germany (Bavaria), Slovenia, Spain (Mallorca), and U.S.A. (Alaska). Fruiting material of *Candelaria concolor*, *Candelariella reflexa*, *Lecanora subaurea*, *Parmelina tiliacea*, and *Rhizocarpon ridescens* is distributed. TLC-analyses were carried out for *Lecanora subaurea*, *Lepraria incana*, and *Ophioparma ventosa*.

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Introduction

The exsiccata series 'Lichenotheca Graecensis' is distributed on exchange basis to the following 19 public herbaria and to one private collection (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, PRA, TNS, UPS, Klaus KALB. A text version of 'Lichenotheca Graecensis' can be found under <http://www.uni-graz.at/walter.obermayer/li-grz1.htm>, a pdf-file is stored under <http://www.uni-graz.at/walter.obermayer/lichenotheca-graecensis-22.pdf>. Label texts originally drafted in a local language have been translated into English by the author.

I wish to thank the following lichenologists who have made their lichen material available: Franz BERGER, Josef HAFELLNER, Helmut MAYRHOFER, and Roman TÜRK.

Three lichenicolous fungi (*Tremella cetrariicola* on *Tuckermannopsis chlorophylla*, *Tremella hypogymniae* on *Hypogymnia physodes*, and *Sphaerellothecium minutum* on *Sphaerophorus fragilis*), present on the distributed lichens, have been kindly determined by Josef HAFELLNER.

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421. *Arthonia cinnabarina* (DeCandolle) Wallroth

AUSTRIA, Oberösterreich (=Upper Austria), district of Rohrbach, 5.7 km south-southeast of the centre of 'Neustift im Mühlkreis', valley of the rivulet Ranna 600 m north of its mouth into the river Danube (Rannamühl), 48°28'47"N, 013°46'33"E, 295 m above sea level, (grid number 7548/2), on bark of *Fraxinus excelsior* (dead tree because of beetle damage), 5 April 2014, collected and determined by Franz BERGER.

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422. *Candelaria concolor* (Dickson) Arnold [sensu stricto]

SLOVENIA, [Primorska], Goriška, Southern Alps, Julian Alps, Koritnica valley, 8.3 km north-northeast of Bovec, near the village Log pod Mangartom, northeast of Spodnji Log, 46°24'10"N, 013°36'10"E, 640 m above sea level, solitary trees (at the roadside), on bark of *Tilia cordata*, 2 July 2003, collected and determined by Helmut MAYRHOFER (20349) Katrin ELLMAIER.

Note: All issued specimens contain fruiting bodies.

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423. *Candelariella reflexa* (Nylander) Lettau

AUSTRIA, Steiermark (=Styria), Oststeirisches Riedelland, 9 km NE of the centre of Graz, Schaftal, Hollergraben, 47°06'51"N, 015°32'37"E, 530 m above sea level, (grid number 8859/3), edge of a forest, on stem bark of a dead tree, 20 April 2014, collected and determined by Walter OBERMAYER (13165).

Note: Almost all issued specimens with apothecia (specimen in GZU richly fruiting).

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424. *Cladonia convoluta* (Lamkey) Anders

SPAIN, Mallorca, 12.3 km south-southeast of the centre of Palma de Mallorca, west of Bellavista, 200 m away from the seashore, 39°28'37.12"N, 002°43'39.35"E, 40 m above sea level, garrigue vegetation, on ground, 24 August 2013, collected and determined by Walter OBERMAYER (13319).

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425. *Lecanora subaurea* Zahlbruckner

AUSTRIA, Kärnten (=Carinthia), Central Eastern Alps, southernmost part of Seetaler Alpen, 1 km south of the summit of Hohenwart, above the road to Klippitztörl, 200 m west of 'Seetaler Hütte', 46°56'40"N, 014°41'10"E, 1550 m above sea level, (grid number 9054/3), boulder field with big siliceous rocks (in a clearing of a European spruce forest), on inclined surfaces of an iron rich schist, 22 October 2011, collected by Josef Hafellner (81340), determined by Josef HAFELLNER & Walter OBERMAYER.

Note: All issued specimens richly fruiting. Some thalli with only scanty developed soralia. - TLC (Obermayer; separated specimen in GZU tested): Pannarin, rhizocarpic acid, zeorin, unknown (2/2/(1-)2, similar to porphyrillic acid), unknown fatty acid (3/?/5).

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426. *Lepraria incana* (Linnaeus) Acharius

AUSTRIA, Steiermark (=Styria), Steirisches Randgebirge, Grazer Bergland, 4 km west of the centre of Weiz, gorge of the river Raab ('Raabklamm'), orographically left side of the river, 47°12'51"N, 015°34'02"E, 520–535 m above sea level, (grid number 8759/3), small ridge in a mixed forest with schist outcrops and small boulders of feldspar rich pegmatite, on south-southeast exposed, vertical (or overhanging) rock faces, 5 November 2014, collected by Josef HAFELLNER and Walter OBERMAYER (13257), determined by Walter OBERMAYER.

Note: TLC (specimen in GZU tested): Divaricatic acid, zeorin. All other specimens have been tested with an UV-lamp (whitish fluorescence due to divaricatic acid). In the easternmost parts of the Alps, *Lepraria incana* mostly occurs on vertical (or overhanging) faces of siliceous rocks in rather shady conditions. In contrast to other European regions, the species is very rarely found on bark of trees on which *Lepraria lobificans* and *L. vouauxii* are the most frequent Leprarias, especially close to [or within] settlements.

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427. *Lobaria pulmonaria* (Linnaeus) Hoffmann

AUSTRIA, Steiermark (=Styria), Dachstein Mountains (south-facing slopes), 4.5 km north-northeast of the centre of Schladming, 4 km east of the centre of Ramsau, forestry road between the farmsteads Reitbauer and Gabäcker ("Jausenstation Fliegenpilz"), 47°25'40"N, 013°42'27"E, 1000 m above sea level, (grid number 8548/3), mixed forest (with *Picea abies*, *Abies alba*, *Fagus sylvatica*, and *Acer pseudoplatanus*), on bark of *Acer pseudoplatanus* (the relatively young but dead tree was marked to be cut down), 21 February 2013, collected and determined by Walter OBERMAYER (12903).

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428. *Menegazzia terebrata* (Hoffmann) Abramo Massalongo

AUSTRIA, Steiermark (=Styria), Dachstein Mountains (south-facing slopes), 4.4 km northeast of the centre of Schladming, 5 km east of the centre of Ramsau, east-facing slopes of Sattelberg, 640 m south of Lodenwalker, 240 m east of Strimitzen, 47°25'26"N, 013°43'12"E, 980 m above sea level, (grid number 8548/3), forest glade with single tall trees of *Acer pseudoplatanus* and *Fagus sylvatica* (reforestation area with young conifers), on bark of *Acer pseudoplatanus*, 23 February 2013, collected and determined by Walter OBERMAYER (12692).

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429. *Nephroma arcticum* (Linnaeus) Torsell

U.S.A., Alaska, Matanuska-Susitna Borough, 45 km north of Talkeetna, surroundings of Byers Lake, along the trail at the cascades southeast above the lake, 62°44'45"N, 150°05'00"W, 350 m above sea level, boreal forest with moss-covered boulders of granite (slope exposed to the north), on mossy ground, 25 August 2010, collected by Josef HAFELLNER (80252) and Lucia MUGGIA, determined by Josef HAFELLNER.

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430. *Ophioparma ventosa* (Linnaeus) Norman

AUSTRIA, Steiermark (=Styria), Central Eastern Alps, Seetaler Alpen, 12 km southwest of the centre of Judenburg, 2.4 km north of the summit of Zirbitzkogel, northwest facing slopes of Schlosserkogel (south of the lake Großer Winterleitensee), 47°05'15"N, 014°33'45"E, 1930–1950 m above sea level, (grid number 8953/1), boulders and low outcrops of pegmatized garnet mica schist in dwarf-shrub communities near the tree line, on strongly inclined surface of mica schist, 30 November 2014, collected and determined by Walter OBERMAYER (13296).

Note: All exsiccata material comes from many different thalli, which were growing on several small boulders. Thus, different genotypes may be present on each specimen. TLC (specimen in GZU tested): Usnic acid, divaricatic acid, thamnolic acid.

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431. *Oxneria huculica* Sergei Yakovlevich

[Synonym: *Xanthoria fallax*, in the sense of several authors]

AUSTRIA, Salzburg, Lungau Region (=Tamsweg district), 2.5 km north-northwest of the centre of Tamsweg, village area of St.Andrä im Lungau, south of Andlwirt, 47°08'49"N, 013°47'37"E, 1048 m above sea level, (grid number 8848/4), on bark of *Acer pseudoplatanus*, 23 September 2013, collected and determined by Roman TÜRK (52442).

Note: Associated lichen: *Candelaria concolor*.

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432. *Parmelina pastillifera* (Harmand) Hale

AUSTRIA, Oberösterreich (=Upper Austria), political district Schärding, municipal territory of Engelhartzell, 8.7 km northeast of Kopfing im Innkreis, Kronschnig, 150 meters southwest of the river bank of the river Danube, 48°28'42"N, 013°45'43"E, 330 m above sea level, (grid number 7548/2), on twigs of old fallen *Juglans regia* (shady conditions), 22 February 2014, collected and determined by Franz BERGER.

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433. *Parmelina tiliacea* (Hoffmann) Hale

SPAIN, Mallorca, Sierra de Tramontana, along the road from Sóller to Lluc, 4 km west-northwest of Lluc, 39°49'43"N, 002°50'15"E, 590 m above sea level, *Pinus* forest with *Olea europaea*, on stem bark of *Olea europaea*, 23 August 2013, collected and determined by Walter OBERMAYER (12991).

Note: All issued specimens with apothecia. Associated *Parmelina tiliacea* has been separated.

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434. *Pertusaria amara* (Acharius) Nylander

AUSTRIA, Steiermark (=Styria), Dachstein Mountains (south-facing slopes), 3.7 km north-northeast of the centre of Schladming, 3.3 km east of the centre of Ramsau, 550 m southwest of the farmstead Reitbauer, 47°25'28"N, 013°41'55"E, 1050 m above sea level, (grid number 8548/3), forest area with *Picea abies*, *Abies alba*, and *Pinus sylvestris*, on bark of *Acer pseudoplatanus*, 21 February 2013, collected and determined by Walter OBERMAYER (12698).

Note: Associated lichens: *Pertusaria albescens* (intermixed in some specimens), *Normandina pulchella*, *Anaptychia ciliaris* (scanty), *Physconia distorta* (scanty); associated liverwort: *Metzgeria temperata*.

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435. *Physcia biziana* (Abramo Massalongo) Zahlbruckner

AUSTRIA, Niederösterreich (=Lower Austria), 15 km west of the centre of Bratislava, Bad-Deutsch-Altenburg, spa gardens along the river Danube, 48°08'26"N, 016°54'00"E, 145 m above sea level, (grid number 7867/3), park and avenue trees, on bark of *Aesculus hippocastanum*, 11 October 2014, collected and determined by Franz BERGER.

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436. *Punctelia jeckeri* (Roumeguère) Kalb

GERMANY, Bayern (=Bavaria), Schwaben (=Swabia), Alpenvorland, 2.2 km east of the centre of Marktoberdorf, 47°46'51.75"N, 010°38'50.35"E, 770 m above sea level, edge of a forest, on bark of *Picea abies* (west-exposed), 9 August 2014, collected and determined by Walter OBERMAYER (13202).

Note: The specimen in GZU is intermixed with *Parmelia sulcata* and *Parmelina tiliacea*.

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437. *Rhizocarpon ridescens* (Nylander) Zahlbruckner

AUSTRIA, Kärnten (=Carinthia), Central Eastern Alps, southernmost part of Seetaler Alpen, 1 km south of the summit of Hohenwart, above the road to Klippitztörl, 200 m west of 'Seetaler Hütte', 46°56'40"N, 014°41'10"E, 1550 m above sea level, (grid number 9054/3), boulder field with big siliceous rocks, on strongly inclined surfaces of an iron rich schist, 22 October 2011, collected and determined by Josef HAFELLNER (81342).

Note: Fertile thalli are present in many issued specimens.

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438. *Sphaerophorus fragilis* (Linnaeus) Person

AUSTRIA, Steiermark (=Styria), Central Eastern Alps, Seetaler Alpen, 12 km southwest of the centre of Judenburg, 2.4 km north of the summit of Zirbitzkogel, northwest facing slopes of Schlosserkogel (south of the lake Großer Winterleitensee), 47°05'15"N, 014°33'45"E, 1930-1950 m above sea level, (grid number 8953/1), edge of flat base of a cirque with boulders and low outcrops of pegmatized garnet mica schist in dwarf-shrub communities near the tree line, on horizontal and slightly inclined surfaces of mica schist (partly covered with bryophytes), 30 November 2014, collected and determined by Walter OBERMAYER (13295).

Note: Thalli of the specimen in GZU are partly infected with *Sphaerellothecium minutum*.

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439. *Thelocarpon laureri* (Flotow) Nylander

AUSTRIA, Oberösterreich (=Upper Austria), Schärding District, 5.8 km south-south-east of the centre of Schärding, 4.3 km west of 'Taufkirchen an der Pram', 1 km north-northwest of Allerding, 48°25'20"N, 013°28'54"E, 370 m above sea level, (grid number 7546/4), quarry site, on rough machined wood of *Picea abies*, 30 December 2012, collected and determined by Franz BERGER (27062).

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440. *Tuckermannopsis chlorophylla* (Willdenow) Hale

AUSTRIA, Steiermark (=Styria), Central Eastern Alps, Seetaler Alpen, 9.7 km west-northwest of the centre of Obdach, 400 northeast below Winterleitenhütte, along the natural toboggan run, 47°05'49"N, 014°34'28"E, 1730 m above sea level, (grid number 8953/1), forest with *Picea abies*, *Larix decidua*, and *Pinus cembra*, on twigs of *Picea abies*, 30 November 2014, collected and determined by Walter OBERMAYER (13297).

Note: Some thalli of specimens in the following twelve herbaria are parasitized by *Tremella cetrariae*: B, C, CANL, E, G, GZU, LE, M, MAF, PRA, UPS, Klaus Kalb). Specimens are partly intermixed with *Bryoria* (different taxa), *Evernia divaricata*, *Hypogymnia physodes* [partly infected with *Tremella hypogymniae*], and *Pseudevernia furfuracea* var. *ceratea*.

Lichenicolous Biota (Nos 181–200)

Josef HAFELLNER*

HAFELLNER Josef 2014: Lichenicolous Biota (Nos 181–200). – Fritschiana (Graz) 78: 9–24. - ISSN 1024-0306.

Abstract: The 8th fascicle (20 numbers) of the exsiccata 'Lichenicolous Biota' is published. The issue contains material of 20 non-lichenized fungal taxa (14 teleomorphs of ascomycetes, 5 anamorphic states of ascomycetes, 1 basidiomycete), including isotype material of *Hainesia xanthoriae* Brackel (no 195). Furthermore, collections of the type species of the following genera are distributed: *Cecidonia* (*C. umbonella*), *Everniicola* (*E. flexispora*), *Geltingia* (*G. associata*), *Marchandiomyces* (*M. corallinus*), *Phacopsis* (*P. vulpina*), *Sclerococcum* (*S. sphaerale*), *Thamnogalla* (*T. crombiei*), and *Rhagadostoma* (*R. lichenicola*). *Sagedia engeliana* Saut. (now *Dacampia* e.), originally described as a lichen, is typified on the lichenicolous fungus which parasitizes thalli of the *Solorina saccata* group.

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Introduction

The exsiccata 'Lichenicolous Biota' is continued with fascicle 8 containing 20 numbers.

The exsiccata covers all lichenicolous biota, i.e., it is open not only to non-lichenized and lichenized fungi, but also to myxomycetes, bacteria, and even animals, whenever they cause a characteristic symptom on their host (e.g., discoloration or galls). Consequently, the exsiccata contains both highly host-specific and plurivorous species, as long as the individuals clearly grow upon a lichen and the collection is homogeneous, so that identical duplicates can be prepared.

The five complete sets are sent to herbaria of the following regions: Central Europe (Graz [GZU]), Northern Europe (Uppsala [UPS]), Western Europe (Bruxelles [BR]), North America (New York [NY]), Australasia (Canberra [CANB]). Incomplete sets will preferably be distributed to Barcelona [BCN], Edinburgh [E], Saint Petersburg [LE], Munich [M], and Prague [PRM] (herbarium acronyms sec. HOLMGREN et al. 1990, continued and updated as electronic database by THIERS 2010, onwards and hosted at New York Botanical Garden <http://sciweb.nybg.org/science2/IndexHerbariorum.asp>). Also in the future it is planned to publish at least one fascicle per year, consisting of a variable number of decades.

The grid reference preceded by the abbreviation 'GF' refers to the grid used by the project 'Floristische Kartierung Mitteleuropas' (floristic mapping of Middle Europe, e.g. EHRENDORFER & HAMANN 1965).

For the 8th issue, I gratefully acknowledge the contribution of three collections by Jana KOCOURKOVÁ (one together with Pavel KOCOUREK), as well as one collection each by Franz BERGER, Curtis BJÖRK, Wolfgang v. BRACKEL, and Michaela SEBERNEGG (together with Helmut MAYRHOFER). In fieldwork I received support by Angela HAFELLNER, Jolanta MIADLIKOWSKA, and Lucia MUGGIA. Jana KOCOURKOVÁ, Franz BERGER, Paul DIEDERICH, and Wolfgang v. BRACKEL contributed to the scientific content of the fascicle by the identification of either lichenicolous fungi or hosts. Walter OBERMAYER, and Helmut MAYRHOFER are thanked for critically reading the manuscript.

I would be much obliged to colleagues who send material of lichenicolous biota for distribution in future fascicles. The collections should be divided up into at least 5 (up to 10) duplicates, preferably already prepared. Unprepared collections should be rich enough to obtain at least 5 duplicates.

181. *Cecidonia xenophona* (Körb.) Triebel & Rambold

in Nova Hedwigia 47: 291 (1988). – Bas.: *Placographa xenophona* Körb. in Parerga Lichenol.: 464 (1865). – Syn.: *Patinella xenophona* (Körb.) Rehm in Rabenh. Krypt.-Fl., Pilze, 2. ed., 1(3): 315 (1890). – *Nesolechia xenophona* (Körb.) Vouaux in Bull. Soc. Mycol. France 29: 416 (1913). – *Lithographa xenophona* (Körb.) Lettau in Hedwigia 52: 118 (1912).

Host: *Porpidia crustulata* (thallus)

Europe, Austria: Steiermark (=Styria), Eastern Alps, Seetaler Alpen, c. 10.4 km SW above the town Judenburg, NE ridge of Wenzelalpe, Ersstand, 47°06'50"N / 14°32' 50"E, c. 2110 m alt., GF 8853/3, low outcrops and small cliffs of eclogitaphibolite in the upper part of the steep slope exp. to the SE, on pebbles lying on the ground.

Note 1: The type host of *Cecidonia xenophona* is *Porpidia contraponenda* (see Triebel & Rambold, l. c.).

Note 2: Following ICBN 60.1., the original spelling of the epithet is retained as none of the cases allowing an orthographic correction is applicable to this name.

24. VII. 2010

leg. J. Hafellner (75915), det. J. Hafellner

distributed to: BCN, BR, CANB, E, GZU, LE, M, NY, PRM, UPS

182. *Dactylospora saxatilis* (Schaer.) Hafellner

in Beih. Nova Hedwigia 62: 129 (1979). – Bas.: *Calicium saxatile* Schaer. in Naturwiss. Anzeig. Allg. Schweizer. Ges. Naturwiss. 5: 35 (1821). – Syn.: *Karschia saxatilis* (Schaer.) Rehm in Rabenh. Krypt.-Fl., Pilze, 2. ed., 1(3): 350 (1890). – *Buellia saxatilis* (Schaer.) Körb. in Syst. Lich. Germaniae: 228 (1855). – *Acolium saxatile* (Schaer.) A.Massal. in Mem. Lichenogr.: 151 (1853). – *Trachylia saxatilis* (Schaer.) Fr. in Fl. Scand.: 282 (1835). – *Buelliella saxatilis* (Schaer.) Fink in Lich. Fl. United States: 372 (1935).

Host: *Pertusaria flavicans* (thallus)

Europe, Austria: Kärnten (=Carinthia), Eastern Alps, Steirisches Randgebirge, Koralpe E above the town Wolfsberg, Steinschneider, gently inclined ridge exposed to the W below the broadcasting station, 46°47'48"N / 14°57'13"E, c. 1980 m alt., GF 9255/2; low outcrops of mineral-rich marble surrounded by alpine meadows, on inclined rock faces.

Note 1: Schaerer thought that the (host) thallus and the lichenicolous discomycete represent together one lichenized species. The name is commonly applied to the lichenicolous fungus.

Note 2: Type material has not been reinvestigated so far, therefore the identity of the host in the type collection remains unclear.

11. VI. 2009

leg. J. Hafellner (73518), det. J. Hafellner

distributed to: BCN, BR, CANB, E, GZU, LE, M, NY, PRM, UPS

183. *Everniicola flexispora* D.Hawksw.

in Notes R. Bot. Garden Edinburgh 40: 384 (1982).

Host: *Nephroma arcticum* (thallus)

North America, U.S.A.: Alaska, Matanuska-Susitna Borough, surroundings of Byers Lake c. 45 km N of Talkeetna, along trail by the cascades SE above the lake, 62°44'45"N / 150°05'00"W, c. 350 m alt.; boreal forest with moss-covered boulders of granite on slope exposed to the N, on the mossy ground.

Note 1: The type host of *Everniicola flexispora* is *Evernia prunastri*.

Note 2: *Everniicola flexispora* is the type species of the genus *Everniicola* D.Hawksw.

25. VIII. 2010

leg. J. Hafellner (80242), det. J. Hafellner
(excursion together with L. Muggia)

distributed to: BCN, BR, CANB, E, GZU, LE, M, NY, PRM, UPS

184. *Geltingia associata* (Th.Fr.) Alstrup & D.Hawksw.

in Meddel. Grønland, Biosci. 31: 33 (1990). – Bas.: *Lecidea associata* Th.Fr. in Svensk. Vetensk. Akad. Handl. 7(2): 42 (1867). – Syn.: *Nesolechia associata* (Th.Fr.) Sacc. & D.Sacc. in Syll. Fung. 17: 171 (1905). – *Leciographa associata* (Th.Fr.) Zopf in Hedwigia 35: 341 (1896).

Host: *Thamnolia vermicularis* (thallus)

North America, Canada: British Columbia: Thompson Plateau, Venables Road, c. 17 km S of Ashcroft, 50°35'N / 121°19'W, c. 550 m alt.; south-facing siliceous cliff in *Artemisia* steppe slightly shaded by *Pinus ponderosa*.

Note 1: The type host of *Geltingia associata* is *Ochrolechia tartarea*. Apart from various *Ochrolechia* species, *G. associata* is occasionally reported on *Pertusaria dactylina* and *Thamnolia vermicularis* (see Diederich et al., Lichenologist 42: 267–268, 2010).

Note 2: *Geltingia associata* is the type species of the genus *Geltingia* Alstrup & D.Hawksw.

19. IV. 2011

leg. C. R. Björk (22459), det. P. Diederich

distributed to: BCN, BR, CANB, E, GZU, LE, M, NY, PRM, UPS

185. *Marchandiomyces corallinus* (Roberge) Diederich & D. Hawksw.

in Diederich, Mycotaxon 37: 312 (1990). – Bas.: *Illosporium corallinum* Roberge in Desmazières, Pl. Crypt. France, Ed. 1, fasc. 32, no. 1551 (1847) [not seen, fide Hawksworth, Bull. Brit. Mus. Nat. Hist., Bot. ser. 6(3): 236, 1979].

Host: *Aspicilia* spec. (thallus)

Europe, Czech Republic: Central Bohemia, distr. Beroun, Křivoklátsko Protected Landscape Area, Točník, below Točník castle, 49°53'24.9"N / 13°53'13.5"E, c. 370 m alt., MTB 6149 A08, on S-facing rocky slope below castle ruins, on porphyric rocks.

Note 1: According to Hawksworth (l.c.), the host of the type collection is *Physcia tenella*.

Note 2: *Marchandiomyces corallinus* is the type species of the genus *Marchandiomyces* Diederich & D.Hawksw.

6. VII. 1998 leg. J. Kocourková (8226) & P. Kocourek, det. J. Kocourková
distributed to: BCN, BR, CANB, E, GZU, LE, M, NY, PRM, UPS

186. *Milospium lacoizquetae* Etayo & Diederich

in Mycotaxon 60: 424 (1996).

Host: *Cladonia digitata* (thallus)

Europe, Czech Republic: Northern Bohemia, distr. Jablonec n. Nisou, Jizerské hory Mts, NW-facing slope of Jizera Mt., at path going to top, 50°50'5.2"N / 15°15'23.4"E, c. 1065 m alt., MTB 5157 D06; remnants of spruce forest, on moribund standing *Picea abies*.

Note 1: The type host of *Milospium lacoizquetae* is *Cladonia parasitica*.

19. VIII. 2000 leg. J. Kocourková (8219), det. J. Kocourková
distributed to: BCN, BR, CANB, E, GZU, LE, M, NY, PRM, UPS

187. *Phacopsis vulpina* Tul.

in Ann. Sci. Nat., Bot., sér. 3, 17: 126 (1852). – Syn.: *Agyrium vulpinum* (Tul.) H.Olivier, Bull. Acad. Géogr. Bot. 16: 196 (1906).

Host: *Letharia vulpina* (thallus)

Europe, Austria: Steiermark (=Styria), Eastern Alps, Niedere Tauern, Schladminger Tauern, uppermost Katschtal NNW of the village Schöder, E below the mountain Sauofen, c. 1.5 km W of the Stampferhütte, 47°16'05"N / 14°02'05"E, c. 1625 m alt., GF 8750/1; subalpine larch forest, on bark of *Larix decidua*.

Note 1: *Letharia vulpina* is the type host of *Phacopsis vulpina*.

Note 2: *Phacopsis vulpina* is the type species of the genus *Phacopsis* Tul.

19. V. 2011 leg. M. Sebernegg & H. Mayrhofer, det. J. Hafellner
distributed to: BCN, BR, CANB, E, GZU, LE, M, NY, PRM, UPS

188. *Pronectria xanthoriae* Lowen & Diederich

in Mycologia 82: 788 (1990).

Host: *Xanthoria parietina* (thallus, apothecia)

Europe, Czech Republic: Southern Moravia, distr. Brno-country, Mokrý-Horákov, Mokrý quarry, in area of limestone quarry on S-facing slope above of the administrative buildings, 49°13'36.6"N / 16°45'27.6"E, c. 390 m alt., MTB 6766 D; in thin growth of tall xeric shrubs, on branches of *Acer campestre*.

Note 1: *Xanthoria parietina* is the type host of *Pronectria xanthoriae*.

11. IX. 2013 leg. J. Kocourková (8207), det. J. Kocourková
distributed to: BCN, BR, CANB, E, GZU, LE, M, NY, PRM, UPS

189. *Sclerococcum sphaerale* (Ach.) Fr.

in Scleromyceti suecici no. 179 (1821). – Bas.: *Spiloma sphaerale* Ach. in Synopsis Method. Lich.: 2 (1814). – Syn.: *Acolium sphaerale* (Ach.) Rehm in Ascomyceten: Hysteriaceen und Discomyceten, Rabenhorst's Kryptogamen-Flora, 2. Aufl., Bd. 1(3): 400 (1889). – *Spilomium sphaerale* (Ach.) H.Olivier in Exposé Lich. l'Ouest France 2: 402 (1903). – *Coniothecium sphaerale* (Ach.) Keissl. in Flechtenparasiten, Rabenhorst's Kryptogamen-Flora, 2. Aufl., Bd. 8: 616 (1930).

Host: *Pertusaria corallina* (thallus)

Europe, Austria: Kärnten (=Carinthia), Eastern Alps, Saualpe W of the town Wolfsberg, Beilstein NW of the Gießlhütte, short ridge N below the summit, 46°50'55"N / 14°42'15"E, c. 1400 m, GF 9154/3; outcrops of eclogite below some scattered *Larix decidua*, on inclined rock faces exposed to the SE.

Note: *Pertusaria corallina* is the type host of *Sclerococcum sphaerale*.

Note 2: *Sclerococcum sphaerale* is the type species of the genus *Sclerococcum* Fr.

16. X. 2010 leg. J. Hafellner (76353), det. J. Hafellner
distributed to: BCN, BR, CANB, E, GZU, LE, M, NY, PRM, UPS

190. *Thamnogalla crombiei* (Mudd) D.Hawksw.

in Notes R. Bot. Garden, Edinburgh 38: 178 (1980). – Bas.: *Endocarpon crombiei* Mudd in Monogr. Brit. Cladoniae: 36 (1865). – Syn.: *Pharcidia crombiei* (Mudd) Sacc. & D.Sacc. in Syll. Fung. 17: 648 (1905).

Host: *Thamnotia subuliformis* (thallus)

Europe, Austria: Steiermark (=Styria), Eastern Alps, Niedere Tauern, Wölzer Tauern, mountain chain N of Lachtal c. 9.5 km NE of the town Oberwölz, Kleiner Zinken, somewhat SW below the summit, 47°16'35"N / 14°21'20"E, c. 2120 m alt., GF 8752/1; W-E directed outcrop of marble surrounded by alpine vegetation, over plant remnants exposed to the N.

Note 1: The type host of *Thamnogalla crombiei* is *Thamnotia vermicularis*.

Note 2: *Thamnogalla crombiei* is the type species of the genus *Thamnogalla* D.Hawksw.

1. IX. 2009 leg. J. Hafellner (73890), det. J. Hafellner
distributed to: BCN, BR, CANB, E, GZU, LE, M, NY, PRM, UPS

191. ***Cecidonia umbonella*** (Nyl.) Triebel & Rambold

in Nova Hedwigia 47: 284 (1988). – Bas.: *Lecidea umbonella* Nyl. in Flora (Regensburg) 49: 372 (1866).

Host: *Lecidea lapicida* subsp. *pantherina* (thallus)

Europe, Austria: Kärnten (=Carinthia), Eastern Alps, Saualpe W above the town Wolfsberg, E ridge of Kienberg NW above of Ladinger Alm, 46°52'55"N / 14°39'20"E, c. 1910 m alt., GF 9153/2; boulders and outcrops of micaschist, on inclined rock faces.

Note 1: As lichenicolous growth originally was not recognized respectively not indicated, no host is mentioned in the protologue. The host in the type collection was tentatively determined as *Lecidea lapicida* (Triebel & Rambold, l.c.).

Note 2: *Cecidonia umbonella* is the type species of the genus *Cecidonia* Triebel & Rambold.

11. IX. 2011

leg. J. Hafellner (78659), det. J. Hafellner

distributed to: BR, CANB, GZU, LE, M, NY, UPS

192. ***Dacampia engeliana*** (Saut.) A.Massal.

in Geneac. Lich.: 22 (1854) (as "*Dacampia Engeliam*"). – Bas.: *Sagedia engeliana* Saut. in Bot. Centralbl. 20: 406 (1846). – Syn.: *Xenosphaeria engeliana* (Saut.) Trevis. in Conspectus Verruc.: 18 (1860). – *Pleospora engeliana* (Saut.) G.Winter in Rabenh. Krypt.-Fl., 2. ed., 1(2): 493 (1885). – *Polyblastia engeliana* (Saut.) H.Olivier in Bull. Acad. Geogr. Bot. 16: 258 (1906).

Host: *Solorina* spec. (thallus)

Europe, Italy: Lombardia, prov. Brescia, Eastern Alps, Central Alps, Ortler-group (Stelvio-group), Cima di Cadi N above Passo del Tonale, N below the summit, 46°16'35"N / 10°34'15"E, c. 2590 m alt.; outcrops and loose stones of calcareous schist in alpine vegetation, on soil.

Note 1: The taxon was originally regarded to constitute a pyrenocarp lichen and the protologue is a combination of both fractions. Sauter (l.c.) saw in it the link between the genera *Endocarpon* (represented by "*E. miniatum*", i.e. *Dermatocarpon miniatum*) and *Sagedia* (represented by "*S. cinerea*", i.e. *Catapyrenium cinereum*). Given thallus characters are those of the lichen genus *Solorina* but the host was not correctly recognized by him.

Note 2: Although combined to several other genera by various authors (see above), *Sagedia engeliana* was not typified on either the thallus forming element or the ascomata-producing one so far. The name is herewith typified on the pyrenocarp lichenicolous fungus.

Note 3: An infection with *Dacampia engeliana* usually oppresses the development of ascomata in the *Solorina* species. Therefore *Solorina*-thalli infested by this lichenicolous fungus are often sterile. Healthy *Solorina octospora* or *S. saccata* thalli are commonly found nearby.

28. VII. 2006

leg. J. Hafellner (75387) & L. Muggia, det. J. Hafellner

distributed to: BCN, BR, CANB, GZU, LE, NY, PRM, UPS

193. ***Dactylospora australis*** Triebel & Hertel

in Triebel, Biblioth. Lichenol. 35: 205 (1989).

Host: *Porpidia* spec. (thallus)

Europe, Austria: Steiermark (=Styria), Eastern Alps, Niedere Tauern, Triebener Tauern, Griesmoar Kogel SW of the village Wald am Schoberpaß, ridge exp. to N above the saddle to Himmeleck, 47°25'15"N / 14°36'10"E, c. 1950 m alt., GF 8553/4; low outcrops of micaschist with low content of calcium, on steep rock faces.

Note 1: The type host of *Dactylospora australis* is *Lecidea lygomma*.

20. VIII. 2002 leg. J. Hafellner (59172) & J. Miadlikowska, det. J. Hafellner
distributed to: BR, CANB, GZU, NY, UPS

194. ***Endococcus macrosporus*** (Hepp ex Arnold) Nyl.

in Lamy, Bull. Soc. Bot. France 25: 504 (1878). – Bas.: *Tichothecium macrosporum* Hepp ex Arnold in Verh. K. K. Zool.-Bot. Ges. Wien 18: 960 (1868).

Host: *Rhizocarpon carpaticum* (thallus)

Europe, Austria: Kärnten (=Carinthia), Eastern Alps, Saualpe W above the town Wolfsberg, Forstalpe, Forstofen (height notation 1967) on the E ridge, 46°53'25"N / 14°40'10"E, c. 1955 m alt., GF 9154/1; exposed cliffs of gneiss, on subvertical to overhanging rock faces exposed to the NE.

Note 1: The type host of *Endococcus macrosporus* is *Rhizocarpon alpicola*.

Note 2: The infection causes a gall-like deformation of the host areoles. Therefore many of the host areoles are strongly convex atypical for healthy *Rhizocarpon carpaticum* areoles.

Note 3: *Rhizocarpon carpaticum* is herewith added to the host spectrum of *Endococcus macrosporus*.

13. VI. 2011 leg. J. Hafellner (78934) & A. Hafellner, det. J. Hafellner
distributed to: BR, CANB, GZU, NY, UPS

Hafellner J. 2014: Lichenicolous Biota (Nos 181–200). - Fritschiana 78: 9–24.

195. *Hainesia xanthoriae* Brackel **Isotype**

in Ber. Bayer. Bot. Ges. 79: 16 (2009).

Host: *Xanthoria parietina* (thallus, apothecia)

Europe, Germany: Bayern (=Bavaria), Oberpfalz, Kreis Neustadt a. d. Waldnaab, NW of Hardt bei Floß, 49°43'23"N / 12°17'22"E, c. 535 m alt., MTB 6239/4; coppice of elder, on branches of *Sambucus nigra*.

Note 1: *Xanthoriicola physciae* (Kalchbr.) D.Hawksw. is also present on the specimens housed in CANB, GZU, NY and UPS.

26. X. 2007

leg. W. v. Brackel (4566), det. W. v. Brackel

distributed to: BR, CANB, GZU, NY, UPS

Hafellner J. 2014: Lichenicolous Biota (Nos 181–200). - Fritschiana 78: 9–24.

196. *Lichenoconium lecanorae* (Jaap) D.Hawksw.

in Bull. Brit. Mus. (Nat. Hist.), Bot. 6(3): 270 (1979). – Bas.: *Coniosporium lecanorae* Jaap in Lindau, Verh. Bot. Vereins Prov. Brandenburg 47: 71 (1906).

Host: *Lecanora polytropa* (apothecia)

Europe, Austria: Steiermark (=Styria), Eastern Alps, Gurktaler Alpen, Turracherhöhe, hills N above of the Turrachsee, ENE above of the hotel Seewirt, 46°55'30"N / 13°52'40"E, c. 1850 m alt.; scattered boulders of Palaeozoic schist in open *Picea abies-Larix decidua-Pinus cembra* forest, on inclined rock faces.

Note 1: The type host of *Lichenoconium lecanorae* is *Lecanora chlorotera*.

27. VII. 2002

leg. J. Hafellner (41805), det. J. Hafellner

distributed to: BR, CANB, GZU, NY, UPS

197. ***Paranectria oropensis*** (Ces.) D.Hawksw. & Piroz.

in Can. J. Bot. 55: 2555 (1977). – Bas.: *Sphaeria Nectria oropensis* Ces. in Rabenhorst, Bot. Zeitung 15: 406 (1857); Rabenhorst, Herb. Mycol., ed. 2, no. 524 (1863). – Syn.: *Nectria oropensis* (Ces.) Tul. & C.Tul. in Sel. Fung. Carp. 3: 95 (1865). – *Ciliomyces oropensis* (Ces. in Rabenh.) Höhn. in Sitzungsber. Akad. Wiss. Wien, Math.-Naturwiss. Kl. 115: 25 (1906).

Host: *Phaeophyscia chloantha* (thallus)

Europe, Austria: Steiermark (=Styria), Eastern Alps, Steirisches Randgebirge, Grazer Bergland, Mühlbacher Kogel c. 5 km NNW of the village Stift Rein, surroundings of Mühlbacher Hütte, 47°10'30"N / 15°15'20"E, c. 995 m alt.; orchard, on bark of *Tilia cordata*.

Note 1: Infections with *Paranectria oropensis* have considerable importance as opener of corticolous lichen synusia leading to a restart of succession. It is herein comparable to *Athelia arachnoidea* (see Hafellner & Obermayer, Herzogia 22: 177–190, 2009).

Note 2: In recent years the bark epiphyte *Phaeophyscia chloantha* has become considerably more frequent and abundant in southeastern Austria and it appears to be one of the species profiting from global warming, namely the milder winters in this area.

8. XII. 2004

leg. J. Hafellner (63892), det. J. Hafellner

distributed to: BR, CANB, GZU, NY, UPS

198. ***Polycoccum microsticticum*** (Leight.) Arnold

in Ber. Bayer. Bot. Ges. 1 (Anh.): 132 (1891). – Bas.: *Verrucaria microstictica* Leight. ex Leight. in Lich. Fl. Great Brit., ed. 1: 461 (1871). – Syn.: *Didymosphaeria microstictica* (Leight.) G.Winter in journal volume: page (year). – *Endococcus microsticticus* (Leight.) Arnold in Flora (Regensburg) 57: 141 (1874).

Host: *Acarospora fuscata* (thallus)

Europe, Austria: Steiermark (=Styria), Eastern Alps, Steirisches Randgebirge, Grazer Bergland, Kulmkogel SE above the village St. Jakob-Breitenau, Kerschbaumalm, 47°21'30"N / 15°31'25"E, c. 1350 m alt., GF 8659/1; low outcrops of metadiabas under some scattered *Picea abies* on slope exposed to the S, surrounded by a subalpine pasture, on inclined rock faces.

Note 1: In the protologue the host of type is given as *Acarospora cervina* (sub *Lecanora* c.) but this needs confirmation.

10. XI. 2012

leg. J. Hafellner (81033), det. J. Hafellner

distributed to: BR, CANB, GZU, NY, PRM, UPS

199. *Rhagadostoma lichenicola* (De Not.) Keissl.

in Rabenh. Krypt.-Fl., 2. Aufl. Pilze 8, Flechtenparasiten: 320 (1930). – Bas.: *Bertia lichenicola* De Not. in Erb. Crittog. Ital. no. 1190 (1864).

Host: *Solorina crocea* (thallus)

Europe, Austria: Steiermark (=Styria), Eastern Alps, Seetaler Alpen, Zirbitzkogel massif SW above the town Judenburg, in the cirque Ochsenboden between the mountains Kreiskogel and Scharfes Eck, small ridge SE of the small lakes, 47°04' 50''N / 14°33'25''E, c. 2000 m alt., GF 8953/1; open dwarf shrub communities between cliffs of micoschist, on patches of soil.

Note 1: *Solorina crocea* is the type host of *Rhagadostoma lichenicola*.

Note 2: The genus *Rhagadostoma* is based on *R. corrugatum* Körb., a later heterotypic synonym of *Bertia lichenicola* De Not.

26. VII. 2013

leg. J. Hafellner (82472), det. J. Hafellner
(excursion together with T. Spribille and A. Fryday)

distributed to: BCN, BR, CANB, GZU, NY, PRM, UPS

200. *Unguiculariopsis acrocordiae* (Diederich) Diederich & Etayo

in Lichenologist 32(5): 471 (2000). – Bas.: *Skyttea acrocordiae* Diederich in Lejeunia 119: 12 (1986).

Host: *Acrocordia gemmata* (thallus)

Europe, Austria: Oberösterreich (=Upper Austria), Mühlviertel, Ranna valley SE of Neustift im Mühlkreis, ravine-like southern part, surroundings of the 6th ford c. 0.6 km NE below the castle Rannriedl, 48°29'09''N / 13°46'37''E, c. 330 m alt., GF 7548/2, deciduous forest, on bark of *Fraxinus excelsior*.

Note 1: *Acrocordia gemmata* is the type host of *Unguiculariopsis acrocordiae*.

Note 2: The ascomata and the host thallus partly have been grazed by snails and slugs but some healthy apothecia are present in each duplicate.

21. X. 2014

leg. F. Berger (s.n.), det. F. Berger

distributed to: BR, CANB, GZU, NY, UPS

Taxon Synopsis:

Taxon	Exs. no.
Ascomycota	
Arthoniomycetes	
Lecanoromycetes (incl. Ostropomycetidae)	
<i>Cecidonia umbonella</i>	191
<i>Cecidonia xenophona</i>	181
<i>Geltingia associata</i>	184
<i>Phacopsis vulpina</i>	187
<i>Thamnogalla crombiei</i>	190
Leotiomycetes	
<i>Unguiculariopsis acrocordiae</i>	200
Sordariomycetes (incl. Hypocreales)	
<i>Paranectria oropensis</i>	197
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9. ANTARCTIC		

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Distributional and other data for some *Agonimia* species (Verrucariales, lichenized Ascomycota)

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Abstract: A treatment of five *Agonimia* species occurring in Austria is presented. Distributional data for many further countries are included. *Agonimia tristicula* is newly recorded for Liechtenstein and Armenia, as is *A. globulifera* for Austria and *A. opuntiella* for the Democratic Republic of the Congo. For *A. tristicula* and *A. opuntiella* facultatively lichenicolous growth is documented.

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Introduction

Verrucarialean fungi with muriform ascospores were traditionally classified in the genera *Endocarpon*, *Staurothele*, *Polyblastia* and *Agonimia*. The phylogenetic approach based on molecular data revealed that practically all these genera are likely to be polyphyletic (GUEIDAN et al. 2007, 2009, SAVIĆ & TIBELL 2008a, b, 2009, SAVIĆ et al. 2008, MUGGIA et al. 2010). Many phenotypic characters were re-evaluated in the light of these new insights, in order to search for sets of morpho-anatomical characters which could be useful for a revised description of monophyletic entities.

Agonimia is generally accepted as a segregate of *Polyblastia* since treatments in major floras have been published (POELT 1969, JAMES 1981, CLAUZADE & ROUX 1985, PURVIS 1992, BREUSS 2002, ORANGE & PURVIS 2009, WIRTH et al. 2013). At first rather narrowly circumscribed (ZAHLEBRUCKNER 1909), the generic concept was somewhat broadened later on, to include several additional species previously treated in *Polyblastia* (SÉRUSIAUX et al. 1999). However, in a recent attempt to reconstruct the phylogeny of some of the more atypical verrucarialean fungi, MUGGIA et al. (2010) detected a polyphyly in *Agonimia*. Also GUZOW-KRZEMIŃSKA et al. (2012) question the monophyly of some of the morphoanatomically circumscribed *Agonimia* species with their molecular results. So we may expect further changes in the future.

In search for *Halospora* species, the former *Polyblastia deminuta* group (HAFELLNER 2010, 2011), the author has screened the polyblastioid material in GZU, LI, SZU, W and some private herbaria. A considerable percentage of relevant

specimens proved to be misidentified. Also a large number of specimens of various *Agonimia* species were annotated during this revision, including some remarkable records. The accumulated notes and data are presented here as a contribution to the knowledge of that genus.

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, 6.4–40x). Anatomical studies of the thallus and the ascomata were carried out under the light microscope (LEICA DMRE, 100–1000x). 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 by the use of Lugol's reagent (I) (MERCK 9261). Sections and squash preparations were not pretreated with KOH (K) unless otherwise stated (K/I). Measurements refer to dimensions in tap water.

Abbreviations for institutional herbaria follow HOLMGREN et al. (1990). Abbreviations of author names are those proposed by BRUMMITT & POWELL (1992). Geographic units are defined and named according to HOLLIS & BRUMMITT (1992) or BRUMMITT (2001).

Material studied for comparison:

Agonimia flabelliformis Halda et al.

Germany: Niedersachsen, SE of Göttingen, Reinhäuser Wald, vicinity of Ischenrode, rock climbing wall known as "Korsar", MTB 4526/31, alt. 280 m, on vertical sandstone wall facing NW, 20. X. 2005, leg. T. Spribille no. 18224 & H. Thiel (GZU).

Agonimia pacifica (H. Harada) Diederich

Japan: Kyushu, Prov. Hyuga, Pref. Miyazaki, en route from Ebino Highlands to Mt. Koshikidake, Ebino city, alt. c. 1200 m, on moss and on bark of *Kalopanax pictus*, 15. XII. 2001, leg. Y. Ohmura no. 4785 & S. Kurogi (= Ohmura, Lich. Minus Cogniti Exs. 376) (GZU).

Agonimia repleta Czarnota & Coppins

Czech Republic: Bohemia sept. orientalis, Nové Město nad Metují, ad septentiones a pago Peklo, prope molam "Suchánkův mlýn", in ripa fluminis "Metuje", alt. 320 m s. m., ad corticem *Tiliae cordatae* vetustae, 3. XI. 2000, leg. J. Halda (= Vězda, Lich. Rar. Exs. 446) (GZU).

Results

Agonimia Zahlbr., Österr. Bot. Z. 59: 350 (1909).

Type: *Agonimia tristicula* (Nyl.) Zahlbr. (lectotype) designated by Clements & Shear, Gen. Fungi: 289 (1931).

= *Agonimiella* H.Harada, Nova Hedwigia 57: 503 (1993).

Type: *Agonimiella pacifica* H.Harada (holotype)

?= *Flakea* O.E.Erikss., Systema Ascomycetum 11: 14 (1992).

Type: *Flakea papillata* O.E.Erikss. (holotype)

Full descriptions: JAMES 1981: 107; PURVIS 1992: 66; BREUSS 2002: 90; ORANGE & PURVIS 2009: 136.

Key characters for identification of the genus: Lichen-forming. Thallus crustose, consisting of a layer or aggregations of goniocysts, or minutely squamulose, squamules in some species proliferating. Cells of the upper cortex in most species with papillae. Ascomata black, of various shape (pyriform or sub-sphaerical). Ascomatal wall layered but lacking an involucrellum. Hamathecium consisting of persistent crown of periphysoids but interascal filaments in mature ascomata lacking. Asci verrucarialean, fissitunicate with very thin exoascus, surrounded by hemiamyloid gel (K/I+ blue), 8-spored or with reduced spore numbers, mostly (1-)2-spored allowing the ascospores to be very large, not rarely up to 150 µm long. Ascospores muriform, hyaline, in some species slightly brownish with age.

Frequently confused genera: *Polyblastia*.

Number of accepted species: 14 (with the inclusion of *Agonimiella* and *Flakea*), of which 11 have so far been reported from Europe.

Species identification: A key including most of the European species was compiled by ORANGE & PURVIS (2009). Lichenologists familiar with the Russian language can also use a key provided by URBANAVICHUS (2013) for a slightly different set of species. LUBEK (2012) prepared a comparative table of 7 *Agonimia* species occurring in Poland.

Notes: 1. Two species were mentioned together with the generic protologue, *A. tristicula* and the newly described *Agonimia latzelii* Zahlbr., of which *A. tristicula* was denominated as the lectotype by CLEMENTS & SHEAR (1931). *Agonimia latzelii* was later regarded to represent a heterotypic synonym of *A. tristicula* or was transferred to that species as infraspecific taxon of low rank (SERVÍT 1936).

2. The core group of *Agonimia* is characterized by pyriform ascomata with a rough surface in the upper part. These species also develop a granular to microlobulate thallus with shades of olive-green to brown. Interestingly, the crustose and smooth-fruited *A. allobata*, judging from molecular data presented by MUGGIA et al. (2010), belongs also to this group.

3. Some further polyblastioid species with a crustose, dark greenish to brown to blackish thallus and subsphaerical perithecia have been combined into *Agonimia* (e.g. *A. gelatinosa*, *A. allobata*) or have been newly described (SÉRUSIAUX et al. 1999, DMYTROVA et al. 2011). At least for *A. allobata* this transfer appears to be correct (MUGGIA et al. 2010).

4. The cortical cells of squamules of *A. tristicula* have been shown to be papillate (COPPINS & BENNELL 1979). Such papillae are said to be present in most of the species (ORANGE & PURVIS 2009).

5. In the phylogenetic reconstruction published by MUGGIA et al. (2010) *Agonimia repleta* forms a separate clade, to which *Flakea papillata* comes out as sister group. This is an unexpected result, because the external ascoma features of *A. repleta* are very similar to those of the type species, *A. tristicula*. Nevertheless, in the light of these additional data the synonymisation of *Flakea* with *Agonimia* appears as uncertain as the supposed polyphyly of *Agonimia*.

Species diversity in Austria: Until now eight species have been reported in Austria (TÜRK & HAFELLNER 2010, sub *Agonimia* and *Polyblastia* p. p., BERGER et al. 2010). Of these the record of *Agonimia vouauxii* (de Lesd.) M.Brand & Diederich, based on a single collection (WITTMANN & TÜRK 1989: 196, sub *Polyblastia* v.), needs to be revised, as similar species have been described in the meanwhile and the material may belong to one of those. For five *Agonimia* species additional data are presented below, of which *A. globulifera* is reported for the first time in Austria.

Agonimia allobata (Stizenb.) P.James in Coppins et al., Lichenologist 24(4): 366 (1992).

≡ *Verrucaria allobata* Stizenb., Bericht über die Tätigkeit der St. Gallischen Naturwissenschaftlichen Gesellschaft 1880–1881: 501 (1882). – *Polyblastia allobata* (Stizenb.) Zschacke, Hedwigia 60: 8 (1919). – *Amphoroblastia allobata* (Stizenb.) Servít, Československé Lišejníky Čeledi Verrucariaceae: 61 (1954).

Typus: Switzerland: “Supra infimos truncos *Fraxinorum* vetustarum prope Ötweil, leg. Hegetschweiler jr.”. n.v. Locality data from protologue.

Full description(s): ZSCHACKE 1933: 465; ORANGE & PURVIS 2009: 137; URBANAVICHUS 2013: 282.

Icon.: SÉRUSIAUX et al. 1999: 11 Fig. 4C (b/w photograph of ascoma in longitudinal section), MUGGIA et al. 2010: 836 Fig. 1C (b/w photograph of habit).

Key characters for identification: Thallus corticolous, crustose, continuous or granular, greenish-grey to brown. Perithecia partly immersed to almost sessile, subglobose, 150–250 µm in diam., dark grey to blackish, ostiolar region usually paler, surface of perithecial wall around ostiolum smooth. Asci 8-spored. Ascospores muriform, hyaline, 29–35 x 10–15 µm.

Ecology: *Agonimia allobata* is a corticolous species with a clear preference for sites with an increased humidity. In Central Europe it is therefore found on bark close to the ground.

Distribution: The species is not very common in Europe but it was added to the national lichen checklists of a number of European countries in more recent years. WIRTH (1997) discussed the possibility that *Agonimia allobata* is among the species that might have spread in Europe in more recent years under the conditions of a changing climate. Outside Europe it is known from North America (FRYDAY 2001).

Exsiccata seen: –

Specimens seen:

EUROPE: Austria: Kärnten (Carinthia), Weissensee, Lackergaben bei Paterzipf, ca. 1040 m, GF 9346, on bark of *Acer pseudoplatanus*, 25. VII. 1999, leg. F. Berger no. 13636 (herb. Berger). – **Switzerland:** Zürich, prope Grüningen, ad radices *Fraxini*, leg. C. Hegetschweiler (M, W). – Zürich, prope Gossau, ad *Fraxini excelsioris* corticem infimum, leg. C. Hegetschweiler (W).

Agonimia gelatinosa (Ach.) M.Brand & Diederich in Sérusiaux et al., *Lejeunia*, n. s., 162: 6 (1999).

≡ *Verrucaria gelatinosa* Ach., *Lichenographia Universalis*: 283 (1810). – *Pyrenula gelatinosa* (Ach.) Schaer., *Enumeratio Critica Lichenum Europaeorum*: 209 (1850). – *Chromatochlamys gelatinosa* (Ach.) Trevis., *Conspectus Verrucarinarum*: 7 (1860). – *Polyblastia gelatinosa* (Ach.) Th.Fr., *Nova Acta Regiae Societatis Scientiarum Upsaliensis* 3: 362 (1861). – *Endocarpon gelatinosum* (Ach.) Müll. Arg., *Flora* (Regensburg) 51: 51 (1868). – *Amphoroblastia gelatinosa* (Ach.) Servít, *Rozpravy Československé Akademie Věd* 65(3): 8 (1955) not validly published (ICBN 33.4).

Typus: Switzerland: over mooses, leg. Schleicher (UPS-Ach, lectotype) n.v., designated by SÉRUSIAUX et al. (1999).

= *Verrucaria nigrata* Nyl., *Actes de la Société Linnéenne de Bordeaux* 21: 430 (1856). – *Polyblastia nigrata* (Nyl.) Lönnr., *Flora* (Regensburg) 41: 631 (1858). – *Sphaeromphale nigrata* (Nyl.) Mudd, *A manual of British lichens*: 282 (1861). – *Amphoroblastia nigrata* (Nyl.) Servít, *Československé Lišejníky Čeledi Verrucariaceae*: 61 (1954). - Typus: France: Hautes-Pyrénées, Barèges, on *Weissia crispulum* in subalpine zone, leg. W. Nylander (H-Nyl 3622, holotype). n.v., checked by SÉRUSIAUX et al. (1999).

Full description(s): SÉRUSIAUX et al. 1999: 6–8; ORANGE & PURVIS 2009: 137; URBANAVICHUS 2013: 284.

Icon.: SÉRUSIAUX et al. 1999: 7 (b/w photograph of habit), 11 Fig. 4E (b/w photograph of ascoma in longitudinal section)

Key characters for identification: Thallus crustose, encrusting bryophytes and detritus, hardly visible with the naked eye, dark grey to dark brown to blackish-brown under the hand lens or dissecting microscope, composed of minute roundish to lobed, fully attached areoles (mostly called goniocysts). Perithecia black, matt, almost completely to only basally immersed, sometimes almost sessile, +/- sphaerical (not pyriform!), 300–500 µm in diam., surface of perithecial wall around ostiolum smooth; ostiolar region mostly not distinctly raised or depressed. Interascal elements absent. Periphysoids distinct, persistent. Asci (4) to 8-spored. Ascospores muriform, hyaline, 30–55 (–60) x 15–20 (–25) µm.

Notes: *Agonimia gelatinosa* does not belong to the core group of the genus as seen from some thallus characters (superficial cells of thallus without papillae) and ascomatal features (shape of perithecia subsphaerical but not pyriform, ostiolar region smooth). Its placement in the genus awaits confirmation by molecular data.

Ecology: In Central Europe *Agonimia gelatinosa* is mostly found on the ground-layer vegetation over basic or intermediate soils at more humid places, e.g. on slopes exposed to the north. Most records originate from the high montane to

alpine vegetation belt, but occasionally it has also been recorded from the lowlands down to sea-level.

Distribution: The species is not very commonly collected in Europe due to the very inconspicuous thallus but it is included in the lichen checklists of most of the European countries. Outside Europe it is known from northern Asia (e.g. KOPACZEVSKAJA et al. 1977), North America (ESSLINGER & EGAN 1995) and from the subantarctic archipelago South Orkney Islands (ØVSTEDAL & LEWIS SMITH 2001).

Exsiccata seen: Vězda, Lich. Bohemoslov. exs. 242 sub *Amphoroblastia muscorum* (M).

Specimens seen:

EUROPE: Austria: Kärnten (Carinthia), Nationalpark Hohe Tauern, Schober-Gruppe, Aichhorn ca. 4 km SE von Heiligenblut, Hänge unter dem Jungfernsprung gegenüber des Ortes, [47°00'45"N / 12°52'00"E], 1100–1160 m, GF 8943/3, Blockschutthalde, auf Moosen, 21. XI. 1987, leg. J. Hafellner no. 17895 & M. Walther (GZU). – Kärnten (Carinthia), Nationalpark Nockberge, Karlwand, Gipfelplateau, alt. 2090 m, Wetterstein-Dolomit, auf Pflanzenresten, 5. VII. 1990, leg. W. Petutschnig (GZU). – Kärnten (Carinthia), [Südalpen], Karnische Alpen, Freikofel E vom Plöckenpass, ca. 6,5 km S von Mauthen, Nordhänge kurz E der Gedenkkapelle, 46°36'20"N / 12°58'40"E, ca. 1480 m, GF 9343/4, Buchen-Fichtenwald über grobem, bemoostem Kalkblockwerk, an Steiflächen von Kalkblöcken, über Moosen, 31. VIII. 2007, leg. J. Hafellner no. 76857 (GZU). – Salzburg, Nationalpark Hohe Tauern, Goldberggruppe, Vorderer Gesselkopf (Geißkopf), am Westgrat knapp unter dem Gipfel, [47°00'50"N / 13°04'20"E], ca. 2950 m, GF 8944/3, kalkhaltige Glimmerschieferblöcke auf einem steilen Westhang, auf Moosen und Pflanzenresten, 10. VIII. 1994, leg. J. Hafellner no. 33266 (GZU). – Salzburg, Niedere Tauern, Radstädter Tauern, Aufstieg vom Großeck zum Speiereck W Mauterndorf über dem Großeck, 2070–2120 m, Silikatfelsen und Kalkschiefer, 22. VII. 1981, leg. J. Poelt, H. Mayrhofer & R. Türk (GZU). – Steiermark (Styria), Nordalpen (Nördliche Kalkalpen), Ennstaler Alpen, Gesäuseberge E von Admont, Gr. Buchstein, im oberen Bereich der N-Hänge etwas E vom Gipfel, 47°36'37"N / 14°35'50"E, ca. 2200 m, GF 8353/4, Polsterseggen-Silberwurzspaliere und niedere Kalkausbisse, N-seitig in erdgefüllten Felspalten, 19. VI. 2005, leg. J. Hafellner no. 69674 & A. Hafellner (GZU). – Steiermark (Styria), Nördliche Kalkalpen, Ennstaler Alpen, Gesäuseberge SE von Admont, Sparafeld, NW-Abhänge, 47°33'00"N / 14°31'45"E, ca. 2150 m, GF 8453, mit Kalkschrofen durchsetzte Polsterseggen-Silberwurzspaliere, auf Moosen und Pflanzenresten, 23. VIII. 2002, leg. J. Hafellner no. 70131 & J. Miadlikowska (GZU). – Steiermark (Styria), Nördliche Kalkalpen, Ennstaler Alpen, Gesäuseberge E von Admont, Hochtor, am W-Grat kurz unter dem Gipfel, 47°33'40"N / 14°37'55"E, ca. 2330 m, GF 8453/2, niedere Kalkschrofen und Fragmente von Spalierweiden-Matten, N-seitig auf Moosen und Pflanzenresten, 24. IX. 2005, leg. J. Hafellner no. 69931 (GZU). – Steiermark (Styria), Nördliche Kalkalpen, Ennstaler Alpen, Lugauer SW von Hieflau, W-Gipfel, in der Umgebung des Gipfelkreuzes, 47°33'12"N / 14°43'20"E, ca. 2210 m, GF 8454/1, Caricetum firmiae-Fragmente und Kalkschrofen, NW-seitig auf Moosen und Pflanzenresten, 3. VII. 2005, leg. J. Hafellner no. 69576 (GZU). – Steiermark (Styria), Eisenerzer Alpen, Eisenerzer Reichenstein ca. 5 km S von Eisenerz, im N-exponierten Kar N unter dem Gipfel, kurz unter dem Rottörl, 47°30'25"N / 14°56'15"E, ca. 1800 m, GF 8455/4, alpine Matten über paläozoischem Kalk, auf Moosen und Pflanzenresten, 1. IX. 1997, leg. J. Hafellner no. 76440 (GZU). – Steiermark (Styria), Eisenerzer Alpen, Gröblzinken S ober dem Präbichl, ca. 5 km SE von Eisenerz, am SW-Grat kurz ober dem Rottörl, 47°30'25"N / 14°56'20"E, ca. 1900 m, GF 8455/4, lückiges Caricetum firmiae über paläozoischem Kalk, auf Pflanzenresten, 1. IX. 1997, leg. J. Hafellner no. 76441a & A. Hafellner (GZU). – Steiermark (Styria), Eisenerzer Alpen, Reichenstein NW von Trofaiach, am Steig zwischen der Krumpalm und dem Krumphals, S ober dem Krumpensee, ca. 1500 m, 47°29'30"N / 14°56'20"E, GF 8555/2, übermooste, ruhende Blockhalde mit niederem Weidengebüsch, N-exponiert, auf moosigen Anrissen und kleinen Böschungen, 29. IX. 1996, leg. J. Hafellner no. 39716 & I. Martínez (herb. Hafellner). – Steiermark (Styria), Eisenerzer Alpen, Reiting W von Trofaiach, auf der Nordseite des Gößeckgipfels, ca. 2200 m, [47°27'00"N / 14°54'00"E], GF 8555/1, Caricetum firmiae, auf

Pflanzenresten, 9. VII. 1984, leg. J. Hafellner no. 11298 (GZU). – Steiermark (Styria), Nordalpen, Mürzsteiger Alpen, Schneealpe, Windberg ca. 7 km NW von Kapellen, knapp S unterhalb vom Gipfel, ca. 1890 m, 47°42'15"N / 15°35'45"E, GF 8259/4, niedere Schrofen aus Triaskalk in Caricetum firmiae, auf Moosen und Pflanzenresten, 25. VII. 2008, leg. J. Hafellner no. 77087 (GZU). – Steiermark (Styria), Niedere Tauern, Wölzer Tauern, NW-Grat der Schoberspitze, [47°24'17"N / 14°09'58"E], ca. 2050 m, GF 8550, Schrofen und Blöcke aus Glimmerschiefer, N-exponierte, Ca-haltige Schieferschrofen, 26. VII. 1985, leg. J. Hafellner no. 14074 (herb. Hafellner). – Steiermark (Styria), Niedere Tauern, Wölzer Tauern, Hohenwart W von Pusterwald, knapp unter dem Gipfel am Steig hinunter zum Pölseckjoch, [47°19'45"N / 14°14'30"E], ca. 2200 m, GF 8651/3, N-exponierte Marmorschrofen mit *Dryas* - Spalieren, auf Moosen und Pflanzenresten, 19. VIII. 1993, leg. J. Hafellner no. 49880 & A. Wilfling (GZU). – Steiermark (Styria), Seetaler Alpen, Zirbitzkogel-Massiv SW von Judenburg, im E-exponierten Kar zwischen dem Kreiskogel und der Schusterleiten, knapp unter dem Grat, ca. 2150 m, GF 8953/1, über Marmor in erdigen Spalten, 4. VIII. 1990, leg. J. Hafellner no. 26129 & W. Obermayer (GZU). – Steiermark (Styria), Grazer Bergland, Plateau des Schöckl N von Graz, 1430–1440 m, GF 8758, niedrige Kalkfelsen, über Moosen in Felsspalten, 2. VII. 1933, leg. J. Poelt (GZU). – Steiermark (Styria), Windische Bühel, enger, W-E verlaufender westlicher Seitengraben des Gamlitzbach-Tales, S Kranach, WSW von Gamlitz, ca. 350 m, GF 9358, feuchter Schluchtwald, schattiger Waldboden, 3. VIII. 1991, leg. H. Pittoni, J. Poelt & N. Scutari (GZU). – Tirol (Tyrol), Osttirol, Karnische Alpen, Porze SW von Obertilliach, am Fuß der Nordwand, [46°39'20"N / 12°34'05"E], ca. 2200 m, GF 9341/1, Kalkblöcke und Rasentreppen, auf Moosen und Pflanzenresten, 8. IX. 1989, leg. J. Hafellner no. 76439 & A. Hafellner (GZU). – **Germany**: Bayern (Bavaria), Nordalpen, Ammergauer Alpen (Ammergebirge), Tegelberg, ca. 6 km E von Füssen, am Steig vom Tegelberghaus zum Brander Schrofen, SW Vorgipfel, 47°33'35"N / 10°47'05"E, ca. 1800 m, N-exponierte, niedere Kalkausbisse, auf Moosen und Pflanzenresten, 4. IX. 2004, leg. J. Hafellner no. 79529 (GZU). – **Italy**: Trentino, Dolomiten, Pordoi-Joch, N-Fuß des Sass Beccle, [46°29'05"N / 11°48'40"E], ca. 2300 m; Hänge mit niedrigen Dolomitschrofen, 25. X. 1984, leg. J. Hafellner no. 11991, zus. mit *Polyblastia sendtneri* (GZU). – Friuli-Venezia Giulia, Prov. Udine, [Südalpen], Karnische Alpen: Mt. Crostis Massiv N von Comeglians, S-Hänge des Mt. Neval, [46°33'50"N / 12°53'30"E], ca. 2000 m; alpine Matten, in moosigen Spalten niederer Schrofen, 17. VIII. 1994, leg. J. Hafellner no. 76926 (GZU). – **Norway**: Oppland, Lom, Jotunheimen, Visdalen, W-exponierte Hänge ca. 1 km NE von Spiterstulen, W-exponierte Abbrüche, ca. 1250 m, 24. VIII. 1984, leg. J. Hafellner no. 12813 & A. Ochsenhofer (herb. Hafellner). – **Slovakia**: Carpati, Tatra Magna, montes Belanské Tatry, in alpe Žd'arská Vidla, supra muscos in rupibus calcareis, alt. 2100–2150 m, 20. VIII. 1958, leg. A. Vězda (= Vězda, Lich. Bohemoslov. exs. 242) (M). – **Svalbard**: Spitzbergen, Woodfjorden, Bockfjorden, Kalkschutthalde mit überschobenen Silikatblöcken zwischen den beiden Thermalquellen Jotunkjeldene (ex errore „Jodquellen“ dictu), 79°17'30"N / 13°17'30"E, ca. 100 m, auf abgestorbenen Laubmoosen, 22. VII. 1979, leg. J. Hafellner no. 5281 (GZU). – **Sweden**: Torne Lappmark, Umgebung von Abisko, Nuolja, auf Pflanzenresten, 13. VII. 1967, leg. J. Poelt no. 5402 (GZU).

Agonimia globulifera M.Brand & Diederich in Sérusiaux et al., *Lejeunia*, n. s., 162: 8 (1999).

Typus: The Netherlands: Noordwijk, Luchterduin, bij Langevelderslag, steile Nhelling van duin, 3.1992, leg. A. M. Brand 27016 (LG, holotype) n.v.

Full description(s): SÉRUSIAUX et al. 1999: 8–13; ORANGE & PURVIS 2009: 137; URBANAVICHUS 2013: 286

Icon.: SÉRUSIAUX et al. 1999: 9 Fig. 2 (b/w photograph of habit), 11 Fig. 4D (b/w photograph of ascoma in longitudinal section)

Key characters for identification: Thallus medium to dark greenish, consisting of tiny, c. 20–50 µm wide lobes, but these lobes might be difficult to discern when they are arranged tightly in a composite crust. Lobes corticated, cortex of a single

cell layer; cortex cells minutely papillate on the outside; thallus partly obtected by sterile, shiny, black, subsphaerical globules, globules 70–200 µm in diam., pseudoparenchymatic in section. Perithecia superficial to semiimmersed, subsphaerical to pyriform, 300–600 µm in diam.; surface of perithecial wall matt; ostiolum slightly depressed, pale brown. Peridial wall 3-layered. Interascal elements absent. Periphysoids distinct, persistent. Asci (4-)8-spored, 100–140 x 30–40 µm. Ascospores persistently hyaline, 35–50 x 15–25 µm, strongly muriform with c. 30–60 cells visible in optical section (fide SÉRUSIAUX et al. 1999).

Notes: SUIJA et al. (2005) argue that the epithalline globules might represent juvenile ascomata. But this is not very likely because mature ascomata are generally scarce or entirely lacking in the specimens. In addition, the ascomata have a different position in relation to the thallus surface, and the texture of ascomatal walls and globules as seen in sections is also quite different.

Ecology: In general *Agonimia globulifera* is a lowland species. Most records are from dry open vegetation types covered by Brometalia communities in mosaic with open patches of soil where synusia rich in cryptogams of the so called “Bunte Erdflechtengesellschaften” have established (SERUSIAUX et al. 1999, DENGGLER & BOCH 2007). But occasionally it is also found in high altitudes in European orobiomes (Alps, Pyrenees) where the local temperature regime may be comparable to the main ecological niche over at least part of the year and depauperate *Psora decipiens* synusia often obtect the soil. Here and there *Agonimia globulifera* is also found lichenicolous, namely upon old *Peltigera* thalli (ZHURBENKO & BRACKEL 2013), but also on *Romjularia lurida* (see below).

Confused species: None. The shiny black globules are very peculiar and distinctive for the species. Ascomata are often few or lacking.

Distribution: The species is not very common in Europe but it may have been overlooked. Together with the protologue the authors cite specimens from localities in The Netherlands, Belgium, Luxembourg, France, Spain, Italy and Sweden (SERUSIAUX et al. 1999). Since then it was reported from a number of further countries including the Czech Republic (MALÍČEK et al. 2008), Estonia (SUIJA et al. 2005), Germany (SPARRIUS 2000, WIRTH 2000), Slovakia (GUTTOVA & PALICE 2004), Switzerland (APTROOT et al. 2001), and the Arctic archipelago Svalbard (ZHURBENKO & BRACKEL 2013). It is herewith newly recorded from Austria.

Exsiccata seen: –

Specimens seen:

EUROPE: Austria: Oberösterreich (Upper Austria), Nördliche Kalkalpen, Totes Gebirge, Warscheneck Massiv, Wurzeralm, N-Hänge des Wurzerkampl, 47°38'45"N / 14°17'05"E, ca. 1420 m, GF 8351/4, lärchenreicher Koniferenwald mit einzelnen Kalkblöcken, auf Erde in Felsspalten, auf *Romjularia lurida* (th.), 24. V. 2010, leg. J. Hafellner no. 75661 (GZU, sub *Romjularia lurida*). – Oberösterreich (Upper Austria), Nördliche Kalkalpen, Ennstaler Alpen, Bosruck-Massiv E vom Pyhrnpass, Bosruck, am Steig kurz W unter dem Gipfel, 47°37'25"N / 14°20'50"E, ca. 1970 m, GF 8352/3, N-exponierte Schrofen aus Triaskalk, auf Erde in Felsspalten, 23. IX. 2006, leg. J. Hafellner no. 67684 & L. Muggia (GZU, sub *Placidium squamulosum*). – Steiermark (Styria), Nördliche Kalkalpen, Ennstaler Alpen, Gesäuseberge E von Admont, Hochtör, S-Hänge, am Steig vom Schneeloch auf den Gipfel, 47°33'30"N / 14°37'55"E, ca. 2050 m, GF 8453/2, gebankte, niedere Kalkschrofen und Fragmente alpiner Rasen, in erdgefüllten Felsspalten zwischen *Romjularia lurida*, 24. IX. 2005, leg. J. Hafellner no. 41824 (GZU). – Steiermark (Styria), Niedere Tauern, Wölzer Tauern, Gastrumerofen NW von Oberwölz, 47°12'30"N / 14°16'25"E, ca. 1020 m, GF 8751/4, S-exponierte Hänge mit von

Dolomitschrofen durchsetztem, lichtem Föhrenwald, in erdgefüllten Felsspalten zwischen *Romjularia lurida*, 12. XI. 2000, leg. J. Hafellner no. 53336 (GZU, sub *Romjularia lurida*). – **Italia**: Basilicata, Prov. Potenza, ca. 2,5 km E der Autobahnausfahrt Lauria Sud, E vom Autobahntunnel, 40°00'30"N / 15°55'05"E, ca. 800 m, Kalk, überweidete Trockenhänge, zwischen *Romjularia lurida*, 3. VI. 1979, leg. J. Hafellner no. 41822 (GZU).

Agonimia opuntiella (Buschardt & Poelt) Vězda, Lich. Rar. Exs. 33: 4 (1997).

≡ *Physcia opuntiella* Buschardt & Poelt in Poelt, Flora (Jena) 169: 24 (1980). – *Phaeophyscia opuntiella* (Buschardt & Poelt) Clauzade & Cl.Roux ex Hafellner in Hafellner et al., Mitteilungen des Naturwissenschaftlichen Vereines für Steiermark 122: 116 (1992).

Typus: Italy: Prov. Bergamo, Bergamasker Alpen, Val Cavallina, von Trockenrasen durchsetzter, thermophiler, ESE exponierter Hangwald kurz N Trescore Balneario, c. 250 m s. m., an offenen, von Kieselschichten durchsetzten Kalkfelsen, 30. V. 1975, leg. J. Poelt (GZU, holotype)!

Full descriptions: POELT 1980: 24–27 (thallus); VĚZDA 1997: 4 (perithecia); BREUSS 2002: 90; ORANGE & PURVIS 2009: 138; URBANAVICHUS 2013: 287.

Icon.: Poelt 1980: 24 Fig. 1 (drawings of thallus habit and cross section), 25 (SEM photographs of thallus and thalline hairs); VĚZDA 1997: [5] (drawings of habit, ascoma in longitudinal section, ascus, ascospore, thalline hair).

Key characters for identification: Thallus of tiny greyish to slightly brownish squamules, squamules usually ascending, proliferating, on upper surface with short whitish stiff hairs composed of bundles of hyaline hyphae. Perithecia similar as in *A. tristricula*, black, matt, laterally attached to squamules, sessile or immersed between squamules, of pyriform shape, 200–250 µm in diam. and 250–350 µm high, surface of perithecial wall around ostiolum rough, ostiolum usually not distinctly depressed. Interascal elements absent. Periphysoids distinct, persistent. Asci (1–)2-spored, 100–150 x 40–60 µm. Ascospores muriform, hyaline when mature, brownish with age, 60–80 x 25–30 µm (also fide VĚZDA 1997).

Notes: Intensity of pigmentation varies with site factors, namely intensity of radiation.

Ecology: In the central European mountains *Agonimia opuntiella* is restricted to the lower vegetation belts. In the Eastern Alps and their foreland it has so far been recorded within an altitudinal range of 220 m to about 1000 m above sea level. It prefers well insolated rocky habitats, mostly limestone or intermediate schists. Lichenicolous growth upon *Collema cristatum* has been observed (see below).

Confused species: Sterile thalli may be confused with young thalli of hairy *Phaeophyscia* species, such as *P. hirsuta*, but thalli of *Agonimia opuntiella* are ascending and recall tiny cacti (name!). Fertile specimens are rare.

Distribution: The overall distribution is still not well documented. In Europe it is listed in the majority of the national lichen checklists. Outside Europe it is known from a few localities in Asia (e.g. JOHN & BREUSS 2004, APTROOT 2011, KONDRATYUK et al. 2013), the Mascarene archipelago (BOOM et al. 2011), Macaronesia (e.g. BARRENO RODRÍGUEZ & RICO 1985), Northern America (e.g. LENDEMER 2004, APTROOT 2011), Southern America (APTROOT 2002, 2011, APTROOT et al. 2008), and Australia (APTROOT 2011). In the central European

mountain chains it is a relatively rare species with confirmed populations from the colline to the montane vegetation belt. However, as it is very tiny, the presence of the species may be easily overlooked. We are able to report it here for the first time from a higher elevation locality in Eastern Africa (Congo).

Exsiccata seen: Obermayer, Dupla Graecensia Lichenum (1999) no. 32 (GZU). – Vězda, Lichenes Rariores Exsiccati no. 247 (GZU). – Vězda, Lichenes Rariores Exsiccati no. 330 (GZU) fertile!

Further specimens seen (all sterile):

EUROPE: Austria: Burgenland, Südburgenland, Güssing, Burg Güssing, Innenhof, „Cavalier“ mit der Zisterne, an der SW-Seite, terricol, ca. 221 m, GF 8963, 1. V. 1979, leg. J. Poelt (GZU). – Kärnten (=Carinthia), Villach, near Warmbad-Villach, Dobratsch, Tscheltschnigkogel, 100 m SE of the entry to the cave called Eggerloch, S-facing sheer rock walls (limestone), 46°35'3"N / 13°49'05"E, 620 m alt., MTB 9448/2, on bryophytes (e.g. *Orthotrichum anomalum*), 25. VIII. 1997, leg. H. Komposch no. 2272 & A. Wilfling (= Obermayer, Dupla Graecensia Lichenum (1999) 32) (GZU). – Niederösterreich (Lower Austria), Thermenalpen, Kalenderberg bei Mödling, ca. 320 m, GF 7963, S-exponierte Abbrüche von Dolomittfelsen, 15. IX. 1984, leg. J. Poelt (GZU). – Steiermark (Styria), Grazer Bergland, S-Hänge des Gamskogel W von Kleinstübing, 450m, GF 8857, Dolomitschrofen im lichten Föhrenwald, auf calcicolen Moosen, 29. IX. 1979, leg. A. Henssen, J. Poelt & H. Mayrhofer (GZU). – Ibid., 12. V. 1988, leg. R. Moberg & J. Poelt (GZU). – Steiermark (Styria), Steirisches Randgebirge, Grazer Bergland, Rücken W vom Weißeck, E vom Ort Friesach, S-exponierte Hänge ober dem Steinbruch, [47°10'30"N / 15°20'40"E], 440–480 m, GF 8858, lockerer Rotföhrenwald mit anstehendem Dolomit, In erdgefüllten Felsspalten zusammen mit *Romuljaria lurida*, 16. V. 1979, leg. J. Hafellner no. 4657 (GZU). – Steiermark (Styria), Steirisches Randgebirge, Grazer Bergland, Kanzelkogel N von Graz, steile W-Hänge kurz S vom Kanzel-Steinbruch, 47°07'00"N / 15°22'40"E, ca. 500 m, GF 8858/3, paläozoische Kalkschrofen zwischen locker stehenden *Quercus pubescens* und *Pinus sylvestris*, auf felshaftenden Moosen/Pflanzenresten, 18. II. 2001, leg. J. Hafellner no. 54295 (GZU). – Steiermark (Styria), Steirisches Randgebirge, Grazer Bergland, Gösser E von Arzberg, am W Rand der SW-exponierten Abbrüche, 47°15'00"N / 15°31'55"E, ca. 950 m, GF 8759, niedere Kalkschrofen an der Geländekante, auf S-exp. Neigungsflächen, auf dem Thallus von *Collema cristatum*, 13. IX. 2009, leg. J. Hafellner no. 74061 (GZU). – Steiermark (Styria), Oststeirisches Hügelland, 8 km N von Bad Radkersburg, Klösch, N ober der Kirche, [46°46'00"N / 15°58'00"E], ca. 350 m, GF 9261/2, auf einer SE-exponierten Felswand, über Moosen auf exponierten Basaltschrofen, 12. III. 1994, leg. B. Wieser no. 753 & J. Hafellner (GZU). – **Czech Republic:** Bohemia, centr. Rakoník, regio Křivoklátsko, loco dicto Čertova skála, 315 m s. m., ad plantas emortuas et ad terram in rupibus spiliticis, 28. IV. 1996, leg. J. Horáková (= Vězda, Lich. Rar. Exs. 247) (GZU). – Moravia, distr. MoravskýKrumlov, in valle fluvii Rokytná sub oppidum Budkovice, alt. 300 m s. m., ad terram humosam pro parte calcariam in rupibus conglomeratis, locis apricis, 19. VIII. 1997, leg. A. Vězda & B. Bruna (= Vězda, Lich. Rar. Exs. 330) (GZU). – **Italy:** Lombardia, Prov. Bergamo, Bergamasker Alpen, Val Cavallina, kurz N von Trescore Balneario, ca. 250 m, auf Kalkfelsen, 30. V. 1975, leg. J. Hafellner no. 8968 (GZU). – **Spain:** Prov. Madrid, E von San Martín de Valdeiglesias, kurz W vom Rio Alberche, 500 m, S-exponierte Silikatfelsen, 11. IX. 1980, leg. J. Hafellner no. 8666 (GZU). – **AFRICA: Democratic Republic of the Congo** (former Zaire): Prov. Nord-Kivu, Virunga Volcanoes N of Goma, lowermost southeastern slope of Nyiragongo, lava field crossing the road c. 2 km NE of the village Kibati, 01°34'40"S / 29°16'25"E, alt. c. 1980 m, lava stream of eruption in 1977, on volcanic rock, 6. III. 1992, leg. J. Üblagger, herb. Hafellner no. 83477 (GZU). – **NORTH AMERICA: U.S.A.:** Texas, Burnet County, 2 km S of Inks Lake State Park off Park Route 4, rock outcrops with mixed oak and juniper, together with *Psorula rufonigra*, 22. IX. 1976, leg. R. S. Egan 9190a (GZU).

Agonimia tristicula (Nyl.) Zahlbr., Österr. Bot. Z. 59: 351 (1909).

≡ *Verrucaria tristicula* Nyl., Flora (Regensburg) 48: 356 (1865). – *Polyblastia tristicula* (Nyl.) Arnold, Flora (Regensburg) 53: 20 (1870). – *Sporodictyon tristiculum* (Nyl.) Dalla Torre & Sarnth., Die Flechten Tirols: 554 (1902).

Typus: Great Britain: Scotland “supra muscos (*Weisiam*) in Aberdeenshire, leg. Jones. (?H-Nyl) n.v. Locality data from protologue.

Full descriptions: ZSCHACKE 1934: 644–645; PURVIS 1992: 67; BREUSS 2002: 91; ORANGE & PURVIS 2009: 138; URBANAVICHUS 2013: 288.

Icon.: SERUSIAUX et al. 1999: 7 (b/w photograph of habit)

Key characters for identification: Thallus of tiny grey-greenish (in the shade) to brownish to middle-brown squamules, forming a more or less closed crust over plant debris or bryophytes, rarely lichens; thalline squamules depressed to ascending with darker upper side, somewhat lobed but rarely proliferating; thalline envelope of perithecia absent. Perithecia black, matt, laterally attached to squamules, sessile or immersed between squamules, of pyriform shape, 200–300 µm in diam. and 250–500 µm high; surface of perithecial wall around ostiolum rough; ostiolum usually not distinctly depressed. Asci (1-)2-spored, 100–180(–200) x 45–70 µm. Ascospores muriform, hyaline when mature, brownish with age, 60–120(–150) x 25–50 µm

Notes: 1. Thalli with strongly proliferating squamules should be compared with *A. octospora* Coppins & P. James (COPPINS & JAMES 1978) and *A. opuntiella*, the former with 8-spored asci, the latter often sterile but squamules provided with small spines recalling glass hairs of *Phaeophyscia* species. These hairs are diagnostic. Proliferating hairless sterile thalli are not determinable with certainty so far.

2. Already NYLANDER (1865) saw similarities to *Verrucaria gelatinosa* Ach., an idea taken up again more than a century later and resulting in the placement of both species in the same genus.

Ecology: In the central European mountains *Agonimia tristicula* grows on bryophytes and plant remnants over calcareous substrates and schists containing some calcium, preferably under temporarily dry microclimatic conditions. Lichenicolous growth is also not rare: For instance, it has already been found upon *Romjularia lurida* as well as several *Peltigera*, *Collema*, and *Leptogium* species.

Confused species: *Agonimia tristicula* is sometimes confused with soil- and detritus-inhabiting *Polyblastia* species. Samples also frequently remain undetermined and then these specimens are usually stored in the herbaria among unidentified *Polyblastia* material.

Distribution: The species is listed in nearly all European national checklists. Outside Europe it is known from Asia (e.g. HARADA 1993), Macaronesia (e.g. JAMES 1981), North America (e.g. GOWARD et al. 1994), South America (APTROOT et al. 2008), Australia (MCCARTHY 1991) and from the subantarctic archipelago South Georgia (ØVSTEDAL & LEWIS SMITH 2001). In the central European mountain chains it is a common species from the montane to the high alpine vegetation belt. More rarely it is recorded from lowland habitats. *A. tristicula* is here reported for the first time from Liechtenstein and Armenia.

Exsiccata seen: Lichenes Selecti Exsiccati Upsalienses 51 (GZU). – Lichenes Selecti Exsiccati Upsalienses 201 (GZU). – Vězda, Lichenes Selecti Exsiccati 77 (GZU).

Further specimens seen:

EUROPE: Albania: Northern Albania, Shkodër [Malësi e Madhe] distr., near the village Lëpushë, 42°31'30"N / 19°44'E, ca. 1000 m, outcrops in a pasture over saxicolous bryophytes, 23. VI. 2000, leg. L. Kashta (GZU). – Northern Albania, Malësi e Madhe distr.: Bjeshkët e Nemuna (Prokletije) mountains, Qafa e Tërthores (Tërthores pass) between the villages Boga and Theth, small ridge shortly above the pass somewhat below the tree line, 42°23'20"N / 19°43'10"E, c. 1650 m, low outcrops of limestone with layers of argillaceous shale in open pine-beech forest, on plant remnants, 14. VIII. 2007, leg. J. Hafellner no. 75343 (together with M. Tretiach, L. Muggia, M. Piccotto & J. Marka) (GZU). – Northern Albania, Malësi e Madhe distr.: Bjeshkët e Nemuna (Prokletije) mountains, saddle N above the village Theth, somewhat E above the saddle, 42°26'40"N / 19°46'20"E, c. 1750 m, low outcrops on slopes exposed to W, pastures somewhat above the tree line on plant remnants and bryophytes, 15. VIII. 2007, leg. J. Hafellner no. 75357, 75388 (together with M. Tretiach, L. Muggia, M. Piccotto & J. Marka) (GZU). – **Austria:** Kärnten (Carinthia), Nationalpark Hohe Tauern, Schober-Gruppe, Aichhorn ca. 4 km SE von Heiligenblut, Hänge unter dem Jungfernsprung gegenüber des Ortes, [47°00'45"N / 12°52'00"E], 1100–1160 m, GF 8943/3, Blockschutthalde, auf Moosen über einem Block eines leicht kalkhaltigen Schiefers, 21. XI. 1987, leg. J. Hafellner no. 17895 & M. Walther (GZU). – Kärnten (Carinthia), Hohe Tauern, Sadnig-(Goldberg-)Gruppe, Asten, ca. 400 m oberhalb vom Sadnig-Haus, GF 9043/4, bodennahe Blöcke in Viehweide, kalkhaltige Grünschiefer, 19. II. 1989, leg. W. Petutschnig (GZU). – Kärnten (Carinthia), Gailtaler Alpen, Reißkofel ca. 11 km E von Kötschach-Mauthen, am Steig von der Reißkofel-Biwakschachtel entlang des W-Grates zum Gipfel, 46°41'10"N / 13°08'10"E, ca. 2060 m, GF 9344/2, Felsschrofen (Triaskalk) und Caricetum firmiae-Fragmente in Gratnähe auf Erde in Felsspalten, 21. VII. 2009, leg. J. Hafellner no. 76077 (GZU). – Kärnten (Carinthia), Nationalpark Nockberge, Karlwand Gipfelplateau, 2090 m alt., Wetterstein-Dolomit, auf Pflanzenresten, 5. VII. 1990, leg. W. Petutschnig (GZU). – Kärnten (Carinthia), Saualpe W von Wolfsberg, Forstalpe ca. 4,5 km SSW vom Klippitztörl, am S-Rand des Plateaus 0,5 km SW vom Gipfel, 46°53'45"N / 14°39'30"E, ca. 2030 m, GF 9153/2, niedere Marmorausbisse im obersten Teil des sanft gestuften Südhanges, auf Moosen und Pflanzenresten, 25. VII. 2009, leg. J. Hafellner no. 73608 & A. Hafellner (GZU). – Kärnten (Carinthia), Steirisches Randgebirge, Koralpe E von Wolfsberg, Steinschneider, sanft geneigter W-Rücken unterhalb der Relaisstation, 46°47'48"N / 14°57'13"E, ca. 1980 m, GF 9255/2, niedere Felsrippe in alpinen Rasen, mineralreicher Marmor, auf Moosen und Pflanzenresten, 11. VI. 2009, leg. J. Hafellner no. 73523 (GZU). – Kärnten (Carinthia), Karnische Alpen, Obere Valentinalm ca. 9 km SW von Mauthen, kurz W oberhalb der Almhütten, 46°37'20"N / 12°54'05"E, ca. 1620 m, GF 9343/3, zerstreute, paläozoische Kalkblöcke im als Weide genutzten Karboden, auf Moosen und Pflanzenresten, 18. VII. 2007, leg. J. Hafellner no. 76129 (GZU). – Ibid., in erdgefüllten Spalten, auf *Peltigera rufescens*, leg. J. Hafellner no. 76133 (GZU). – Kärnten (Carinthia), Karnische Alpen, Polinik NE vom Plöckenpaß, zwischen der Oberen Spielboden Alm und dem Spielbodentörl, [46°37'30"N / 12°59'15"E], 1900–2100 m, GF 9343, niedere Kalkblöcke in alpinen Rasen, auf Moosen über dünnen Humusaufgaben, 18. VII. 1978, leg. J. Hafellner no. 2919 (GZU). – Kärnten (Carinthia), Karnische Alpen, Freikofel E vom Plöckenpass, ca. 6,5 km S von Mauthen, Nordhänge kurz E der Gedenkkapelle, 46°36'20"N / 12°58'40"E, ca. 1480 m, GF 9343/4, Buchen-Fichtenwald über grobem, bemoostem Kalkblockwerk, an Steiflächen von Kalkblöcken über Moosen, 31. VIII. 2007, leg. J. Hafellner no. 76857 (GZU). – Kärnten (Carinthia), Karnische Alpen, Hochwipfel ca. 15 km WSW von Hermagor, am N-Grat hinab zum Kirchbacher Wipfel, kurz unterhalb vom Gipfel, 46°35'47"N / 13°10'40"E, ca. 2160 m, GF 9445/1, Ausbisse eines paläozoischen, silikatischen Schiefers in alpinen Rasen und lückigen Zwergstrauchbeständen, auf Moosen und Pflanzenresten, 2. IX. 2007, leg. J. Hafellner no. 76098 & W. Obermayer (GZU). – Kärnten (Carinthia), Karnische Alpen, Naßfeld ca. 10 km SW von Hermagor, Garnitzenberg E über der Passhöhe, kurz N unterhalb vom Gipfel, 46°33'40"N / 13°18'00"E, ca. 1930 m, GF 9445/2, Schieferblockwerk und lückige Rasenbänder im Bereich der Waldgrenze, auf Pflanzenresten, 6. VIII. 2007, leg. J. Hafellner no. 76182 (GZU). – Kärnten (Carinthia), Karnische Alpen, Oisternig SW von Feistritz im Gailtal, SE-Abhänge gegen die Feistritzer Alm,

[46°33'55"N / 13°30'30"E], ca. 1850 m, GF 9447/1, paläozoische Kalkschrofen, auf Pflanzenresten in Felsspalten, 22. VI. 1987, leg. J. Hafellner no. 17266 (GZU). – Niederösterreich (Lower Austria), Nördliche Kalkalpen, Schneeberg NW von Neunkirchen, Kaiserstein, knapp E unter dem Gipfel am Südrand der Abbrüche in die Breite Ries, 47°46'25"N / 15°48'45"E, ca. 2000 m, GF 8260/2, Rasentreppen mit kleinen Kalkschrofen, auf Moosen und Pflanzenresten, 29. VI. 1997, leg. J. Hafellner no. 42231 (GZU). – Niederösterreich (Lower Austria), Nordalpen (Nördliche Kalkalpen), Mürzsteger Alpen, Rax-Massiv, Bieskogel ca. 1,3 km E vom Habsburghaus, S-seitig an die sanfte Gipfelkuppe, 47°42'50"N / 15°42'55"E, ca. 1920 m, GF 8260/3, Ausbisse mesozoischer Kalke in Caricetum firmae auf Moosen und Pflanzenresten, 2. IX. 2012, leg. J. Hafellner no. 81130 (GZU). – Niederösterreich (Lower Austria), Nördliche Kalkalpen, Nördliche Kalkalpen, Hohe Wand W von Wiener Neustadt, Aufstieg zur Hohen Wand über die Krumme Ries, 650–850 m, GF 8162, Kalkfelsen, 21. VI. 1984, leg. H. Mayrhofer no. 4174 & J. Poelt (GZU). – Oberösterreich (Upper Austria), Nördliche Kalkalpen, Totes Gebirge, Warscheneck Massiv, Kuppe (Kote 2137) SW über der Speikwiese, etwas NW unterhalb des Gipfels, 47°39'25"N / 14°15'25"E, ca. 2130 m, GF 8351/2, niedere Triaskalkausbisse im Caricetum firmae, auf Moosen und Pflanzenresten, 5. VI. 2010, leg. J. Hafellner no. 75672 (GZU). – Oberösterreich (Upper Austria), Nördliche Kalkalpen, Totes Gebirge, Warscheneck Massiv, Wurzeralm, N-Hänge des Wurzerkampl, 47°38'45"N / 14°17'05"E, ca. 1420 m, GF 8351/4, lärchenreicher Koniferenwald mit einzelnen Kalkblöcken, auf Erde in Felsspalten, auf *Leptogium* spec., 24. V. 2010, leg. J. Hafellner no. 75660 (GZU). – Oberösterreich (Upper Austria), [Nördliche Kalkalpen], Warscheneck, Brunnsteinkar, ca. 1700 m, 47°39'26"N / 14°16'E, GF 8351, S-exponierte Kalkbänder, 28. VI. 2003, leg. F. Berger no. 19272 (herb. Berger). – Oberösterreich (Upper Austria), Nördliche Kalkalpen, Ennstaler Alpen, Bosruck-Massiv E vom Pyhrnpass, Lahnerkogel, im Gipfelbereich, 47°37'10"N / 14°19'55"E, ca. 1850 m, GF 8351/4, niedere Kalkschrofen zwischen lückigen *Pinus mugo*-Beständen, N-exponiert auf Rohhumus unter *Pinus mugo*, 23. IX. 2006, leg. J. Hafellner no. 67637 & L. Muggia (GZU). – Oberösterreich (Upper Austria), Nördliche Kalkalpen, Ennstaler Alpen, Haller Mauern, Großer Pyhrngas SE von Spital am Pyhrn, SW-Hänge, kurz NE über dem Rohrauerhaus, 47°38'20"N / 14°23'40"E, ca. 1350 m, GF 8352/3, Lichtung im montanen Fichtenwald, auf Moosen und Pflanzenresten über kleinen Kalkblöcken, 15. X. 2006, leg. J. Hafellner no. 67734 (GZU). – Salzburg, Pinzgau, Hohe Tauern, Glockner-Gruppe, N-Hänge des Kitzsteinhorns, ca. 0,5 km W vom Bundessportheim, 47°12'35"N / 12°41'10"E, ca. 2450 m, GF 8742/3, alpine Matten auf kalkhaltigem Grünschiefer / Kalkschiefer, auf Moosen und Pflanzenresten, 20. VII. 1996, leg. J. Hafellner no. 38301 & H. Wittmann (GZU). – Salzburg, Nationalpark Hohe Tauern, Goldberggruppe, Vorderer Gesselkopf (Geißlkopf), am Westgrat knapp unter dem Gipfel, [47°00'50"N / 13°04'20"E], ca. 2950 m, GF 8944/3, kalkhaltige Glimmerschieferblöcke auf einem steilen Westhang, auf Moosen und Pflanzenresten, 10. VIII. 1994, leg. J. Hafellner no. 33279 (GZU). – Salzburg, Nationalpark Hohe Tauern, Glockner Gruppe, NW-Grat des Großen Magrötzen Kopfs W ober dem Hochtor, knapp NE unter dem Grat, [47°05'10"N / 12°50'10"E], ca. 2620 m, GF 8943/1, Kalkschiefer, über Moosen und Pflanzenresten, 5. VIII. 1996, leg. J. Hafellner no. 38096 & H. Wittmann (GZU). – Steiermark (Styria), Nördliche Kalkalpen, Totes Gebirge, Tauplitzalm-Gebiet NE von Bad Mitterndorf, Bartlrücken N ober dem Steirersee, 47°37'25"N / 14°01'55"E, ca. 2130 m, GF 8350/3, Windkanten im Gipfelbereich, Kalk, Caricetum firmae, auf Pflanzenresten, 4. VII. 1999, leg. J. Hafellner no. 48915 (GZU). – Steiermark (Styria), Nördliche Kalkalpen, Totes Gebirge, am Steig vom Ort Tauplitz zum Steirersee, S-Hänge der Lahnergrube, 47°35'40"N / 14°01'30"E, ca. 1460 m, GF 8450/1, Kalkblöcke auf Lichtungen im Bergahorn-Buchen-Fichtenwald, auf Moosen und Pflanzenresten, 10. VII. 2010, leg. J. Hafellner no. 75597 (GZU). – Ibid., auf *Leptogium* spec., 10. VII. 2010, leg. J. Hafellner no. 75598 (GZU). – Steiermark (Styria), Nordalpen, Nördliche Kalkalpen, Totes Gebirge, Hochtausing N über Wörschach, im obersten Teil des W-Grates kurz unterhalb des Gipfels, 47°35'05"N / 14°09'20"E, ca. 1810 m, GF 8450/2, S-exp. Schrofen aus Triaskalk zwischen Rasenfragmenten und *Pinus mugo*-Flecken, auf felshaftenden Moosen, 3. X. 2010, leg. J. Hafellner no. 76225 (GZU). – Steiermark (Styria), Nordalpen (Nördliche Kalkalpen), Totes Gebirge, Hochangern-Massiv N von Liezen, Nazogl, knapp NE vom Gipfel auf dem Rücken gegen den Angerkogel, 47°36'45"N / 14°13'50"E, ca. 2050 m, GF 8351/3, alpine Rasen (Caricetum firmae) mit kleinen Felsausbissen und Blöcken (Triaskalk), auf Pflanzenresten, 10. VIII. 2010, leg. J. Hafellner no. 76027 & L. Muggia (GZU). – Steiermark (Styria), Nördliche Kalkalpen, [Ybbstaler Alpen], Lassing Alpen, oberste E-exponierte Hänge im Geißangerlgraben, 47°45'30"N / 15°08'10"E, ca. 1140 m, GF 8256/2,

Buchen-Tannen-Fichten-Urwald, an *Fagus sylvatica* über corticolen Moosen, 7. VII. 1991, leg. J. Hafellner no. 47176 (GZU). – Steiermark (Styria), Nördliche Kalkalpen, Ennstaler Alpen, Gesäuseberge SE von Admont, niedere Kuppe zwischen Riffel und Kalbling, 47°33'05"N / 14°31'05"E, ca. 2000 m, GF 8453/1, kleine Ausbisse aus Triaskalk in alpinen Rasen, S-exponiert auf Erde, auf *Peltigera rufescens*, 13. IX. 2006, leg. J. Hafellner no. 67805 (GZU). – Steiermark (Styria), Nördliche Kalkalpen, Ennstaler Alpen, Gesäuseberge E von Admont, am Steig von Johnsbach zur Hess-Hütte, kurz E oberhalb der Unteren Koderalm, 47°32'45"N / 14°38'35"E, ca. 1520 m, GF 8453/4, koniferenreicher Mischwald, auf Kalkblöcken, auf *Collema spec.*, 25. IX. 2005 bzw. 11. IX. 2006, leg. J. Hafellner no. 67554 (GZU). – Steiermark (Styria), Eisenerzer Alpen, S-Fuß des Zeiritzkampel N von Kalwang, kurz N der Achner Alm, ca. 1250 m, GF 8554/2, 47°28'30"N / 14°45'00"E, Weide mit erratischen Blöcken, auf Kalkblöcken über Moosdecken, 11. V. 1997, leg. J. Miadlikowska, A. Hafellner & J. Hafellner no. 40543 (GZU). – Steiermark (Styria), Eisenerzer Alpen, Eisenerzer Reichenstein ca. 5 km S von Eisenerz, im N-exponierten Kar N unter dem Gipfel, kurz unter dem Rottörl, 47°30'25"N / 14°56'15"E, ca. 1800 m, GF 8455/4, alpine Matten über paläozoischem Kalk, auf Moosen und Pflanzenresten, 1. IX. 1997, leg. J. Hafellner no. 76440 (GZU). – Steiermark (Styria), Eisenerzer Alpen, Reichenstein NW von Trofaiach, zwischen der Krumpalm und dem Krumpensee, 47°29'30"N / 14°56'30"E, ca. 1420 m, GF 8555/2, niedere Kalkblöcke in einem subalpinen Weiderasen, über Pflanzenresten in erdigen Spalten, 29. IX. 1996, leg. J. Hafellner no. 39886 & I. Martínez (GZU). – Steiermark (Styria), Eisenerzer Alpen, Grüblzinken S ober dem Präbichl, ca. 5 km SE von Eisenerz, am SW-Grat kurz ober dem Rottörl, 47°30'25"N / 14°56'20"E, ca. 1900 m, GF 8455/4, lückiges Caricetum firmae über paläozoischem Kalk, auf Pflanzenresten, 1. IX. 1997, leg. J. Hafellner no. 76441a & A. Hafellner (GZU). – Steiermark (Styria), Eisenerzer Alpen, Reiting-Massiv W von Trofaiach, Kahlwandspitze, auf dem Gipfel, 47°26'15"N / 14°53'40"E, ca. 2090 m, GF 8555/3, lückiges Caricetum firmae über paläozoischem Kalk, auf Moosen und Pflanzenresten in Felsspalten, 23. IX. 1997, leg. J. Hafellner no. 43969 & A. Hafellner (GZU). – Steiermark (Styria), Eisenerzer Alpen, „Hochschwab-Gruppe“, Polster E oberhalb von Eisenerz, N-exponierte Hänge knapp unter dem Gipfel, 47°32'N / 14°57'40"E, ca. 1850 m, GF 8455/4, paläozoische Kalke, über Moosen und Pflanzenresten, 17. VIII. 1998, leg. J. Hafellner no. 45878 (GZU). – Steiermark (Styria), Nördliche Kalkalpen, Hochschwab-Gruppe, Großer Ebenstein N der Sonnshienhütte, N-Kante des Gipfelplateaus, 47°36'20"N / 15°01'40"E, ca. 2120 m, GF 8356/3, Caricetum firmae, auf Moosen und Pflanzenresten, 3. XI. 1984, leg. J. Hafellner no. 11808 (GZU). – Steiermark (Styria), Nördliche Kalkalpen, Hochschwab-Gruppe, Aflenzer Staritzen N von Seewiesen, sanfte N-Hänge zwischen Mieserkogel und Krautgartenkogel, 47°38'10"N / 15°15'05"E, 1850–1900 m, GF 8357/4, Caricetum firmae mit Kalkblöcken, in Kalkfelsspalten, 13. X. 1990, leg. J. Hafellner no. 51855, W. Obermayer & E. Lopez de Silanes (GZU). – Steiermark (Styria), [Mürzsteger Alpen], Schneealpe N von Mürzzuschlag, Windberg (höchster Gipfel), ca. 1880–1895 m, GF 8259/4, schrofige, SE-seitige Abbrüche, Kalk, auf Moosen, 19. VIII. 1990, leg. J. Poelt (GZU). – Steiermark (Styria), Nordalpen (Nördliche Kalkalpen), Mürzsteger Alpen, Veitsch Alpe N von Kindberg, am oberen Rand der S-seitigen Abbrüche, kurz SE vom Graf-Meran-Haus, markante Felsrippe etwas NE unter der Stütze der Materialeilbahn, 47°38'40"N / 15°24'40"E, ca. 1790 m, GF 8358/3, N-exponierte schrofige Steilhänge, Wettersteinkalk (Trias), auf Moosen und Pflanzenresten, 5. VI. 2005, leg. J. Hafellner no. 71281 (GZU). – Steiermark (Styria), Nordalpen, Mürzsteger Alpen, Schneealpe, Windberg ca. 7 km NW von Kapellen, knapp S unterhalb vom Gipfel, ca. 1890 m, 47°42'15"N / 15°35'45"E, GF 8259/4, niedere Schrofen aus Triaskalk in Caricetum firmae, auf Moosen und Pflanzenresten, 25. VII. 2008, leg. J. Hafellner no. 77087 (GZU). – Steiermark (Styria), Niedere Tauern, Schladminger Tauern, Znachspitze SE ober der Giglachseehütte S von Schladming, schrofendurchsetzte NW-Hänge E ober dem Znachsattel, 47°16'30"N / 13°38'35"E, ca. 2120 m, GF 8747/2, leicht kalkhaltiger Glimmerschiefer, auf Moosen und Pflanzenresten, 27. VIII. 2001, leg. J. Hafellner no. 56696 (GZU). – Steiermark (Styria), Niedere Tauern, Schladminger Tauern, Weg von der Ursprungalm zum Preuneggsattel, 47°17'42"N / 13°37'41"E, ca. 1690 m, GF 8747/2, 27. VIII. 2001, leg. R. Türk no. 32231 (GZU). – Steiermark (Styria), Niedere Tauern, Schladminger Tauern, Kleinsölktales S von Gröbming, Kochofen über Kleinsölk, Marmorband ca. 50 m unter dem Gipfel, [47°23'45"N / 13°54'50"E], ca. 1850–1880 m, GF 8649/1, SE-exponierte Abbrüche, auf Erde und Erdmoosen, 1. VII. 1993, leg. A. Wilfling no. 1513 (GZU). – Steiermark (Styria), Niedere Tauern, Schladminger Tauern, Deneck S über St. Nikolai im Sölktales, S-Hänge oberhalb des Steiges vom Unteren Kaltenbachsee zum Mittleren Kaltenbachsee, 47°17'00"N /

14°04'15"E, ca. 1920 m, GF 8750/1, Felswand und große Blöcke aus feinkristallinem Marmor, auf Moosen und Pflanzenresten, 20. IX. 2009, leg. J. Hafellner no. 74129 & L. Muggia (GZU). – Steiermark (Styria), Niedere Tauern, Wölzer Tauern, Gumpeneck SE von Gröbming, N-seitig am Grat knapp ober dem Sattel zwischen Zinken und Gumpeneck, 47°24'05"N / 14°01'00"E, ca. 2080 m, GF 8550/3, über Marmor, auf Moosen und Pflanzenresten, 10. VI. 1993, leg. J. Hafellner no. 30808 & A. Wilfling (GZU). – Steiermark (Styria), Niedere Tauern, Wölzer Tauern, Krautwasch W oberhalb der Neunkirchner Hütte, im obersten Teil des Grates N der Haseneckscharte, [47°16'45"N / 14°07'10"E], ca. 2330 m, GF 8750/4, breite Marmorrippe, auf Pflanzenresten, 18. IX. 1992, leg. J. Hafellner no. 30121 & A. Hafellner (GZU). – Steiermark (Styria), Niedere Tauern, Wölzer Tauern, Eselsberggraben NW von Oberwölz, im Talschluß ca. 0,75 km W der Neunkirchner Hütte, am N-Fuß der Rettkirchspitze unterhalb der markanten Marmorrippe im lockeren Lärchen-Zirbenwald, 47°16'30"N / 14°08'25"E, ca. 1580 m, GF 8750/2, große, mit Quarzitadern durchsetzte Marmorblöcke zwischen Zwergsträuchern und Grünerlen, auf Moosen und Pflanzenresten über den Blöcken, 12. VII. 2003, leg. J. Hafellner no. 73944 (GZU). – Steiermark (Styria), Niedere Tauern, Wölzer Tauern, Gastrumerofen NW von Oberwölz, 47°12'30"N / 14°16'25"E, ca. 1020 m, GF 8751/4, S-exponierte Hänge mit von Dolomitschrofen durchsetztem, lichtem Föhrenwald, auf Moosen und Pflanzenresten, 12. XI. 2000, leg. J. Hafellner no. 53346 (GZU). – Steiermark (Styria), Niedere Tauern, Wölzer Tauern, Berge NW von Pusterwald, Nordhänge des Bergrückens zwischen Schönfeldspitz und Hirnkogel, Feldkar, 47°21'00"N / 14°14'00"E, ca. 1790 m, GF 8651, große, erratische Marmorblöcke im sanft geneigten Quellbett unter den markanten hellgrauen Marmorabbrüchen, S-seitig auf Moosen und Pflanzenresten, 15. VIII. 2009, leg. J. Hafellner no. 73702 (GZU). – Steiermark (Styria), Niedere Tauern, Wölzer Tauern, Berge NW von Pusterwald, Nordhänge des Bergrückens zwischen Schönfeldspitz und Hirnkogel, Abbrüche und Blockhalde zwischen Feldkar und Alpl, 47°20'52"N / 14°13'55"E, ca. 1930 m, GF 8651/3, N-exponierte Marmor-schrofen, auf Moosen und Pflanzenresten, 15. VIII. 2009, leg. J. Hafellner no. 73777 & A. Hafellner (GZU). – Steiermark (Styria), Niedere Tauern, Wölzer Tauern, Berge ca. 4 km W von Pusterwald, N Abhänge des Bergrückens zwischen Steineck und Stubenberg, 47°17'45"N / 14°17'55"E, ca. 2040 m, GF 8751/2, Ausbisse eines Marmorbandes in alpiner Vegetation, auf Moosen und Pflanzenresten, 29. VII. 2012, leg. J. Hafellner no. 80922 (GZU). – Steiermark (Styria), Niedere Tauern, Wölzer Tauern, Berge ca. 5 km SW von Pusterwald, Schießbeck, NE-Rücken, markante helle Felspartie am steilen E-Hang W über der Grillerhütte, 47°16'48"N / 14°19'55"E, ca. 2000 m, GF 8751/2, mit Silikat überdeckte Marmorschrofen in alpiner Vegetation, auf Moosen und Pflanzenresten, 11. VII. 2009, leg. J. Hafellner no. 73320 & A. Hafellner (GZU). – Steiermark (Styria), Niedere Tauern, [Seckauer Tauern], Triebener Tauern, Triebenstein N ober dem Ort Hohentauern, am Westgrat kurz unter dem Gipfel, 47°26'45"N / 14°29'10"E, ca. 1800 m, GF 8552/4, niedere paläozoische Kalkschrofen und *Dryas*-Spaliere, S-seitig auf Pflanzenresten, 23. IX. 2000, leg. J. Hafellner no. 52808 & A. Hafellner (GZU). – Steiermark (Styria), Niedere Tauern, [Seckauer Tauern], Triebener Tauern, Griesmoar Kogel SW von Wald am Schoberpaß, im oberen Teil des E-Rückens, 47°25'05"N / 14°36'20"E, ca. 1920 m, GF 8553/4, S-exponierte Schrofen aus leicht karbonathaltigem Grünschiefer, über Moosen und Pflanzenresten, 14. VII. 2001, leg. J. Hafellner no. 56077 (GZU). – Steiermark (Styria), Murberge, Stolzalpe NE ober Murau, kurz SE der Kapelle, ca. 1180 m, 47°07'10"N / 14°11'25"E, GF 8851/3, Lichtung im Koniferen-Mischwald, bodennah an niederen Kalkschrofen, über saxicolen Moosdecken, 13. V. 1999, leg. J. Hafellner no. 48950 (GZU). – Steiermark (Styria), Murberge, 1 km SE Oberwölz, E Schloß Rothenfels, 830–900 m, 47°12'N / 14°18'E, GF 8751/4, SW-exponierter, schrofenreicher Dolomit-Föhrenwald, auf calcicolen Moosen, 2. V. 1994, leg. J. Poelt, H. Pittoni & H. Köckinger (GZU). – Steiermark (Styria), Gurktaler Alpen, NW-exponierte Abbrüche zwischen Kornock und Rinsennock über der Winkleralm, W der Turracherhöhe, [46°54'47–56"N / 13°51'07–18"E], 2160–2180 m, Gf 9049, auf Moosen, 12. IX. 1985, leg. H. Mayrhofer, J. Poelt et al. (GZU). – Steiermark (Styria), Zentralalpen, Seetaler Alpen, Bergrücken zwischen Wenzelalpe und Kreiskogel, kurz S über dem Sattel (Kote 2073), 47°05'45"N / 14°32'50"E, ca. 2100 m, GF 8953/1, niedere Ausbisse aus Marmor in lückiger Vegetation mit dominanter *Saxifraga oppositifolia*, auf Moosen und Pflanzenresten, 1. VIII. 2010, leg. J. Hafellner no. 75962 (GZU). – Steiermark (Styria), Seetaler Alpen, Zirbitzkogel-Massiv SW von Judenburg, SE-exponierte Hänge des Rückens zwischen Speikkogel und Kreiskogel, [47°05'30"N / 14°33'35"E], ca. 1900 m, GF 8953/1, teilweise stark Ca-hältige Amphibolite, in erdigen Spalten, 4. VIII. 1990, leg. J. Hafellner no. 26168 & W. Obermayer

(GZU). – Steiermark (Styria), Steirisches Randgebirge, Koralpe, im oberen Teil des Seekars unterhalb vom Seespitz, [46°47'20"N / 14°58'50"E], ca. 1900 m, GF 9255/2, SE-exponierte Marmorschrofen, zum Teil von Schiefer überdeckt, auf Erde, 19. IX. 1993, leg. A. Wilfling no. 2604 (GZU). – Steiermark (Styria), Steirisches Randgebirge, Koralpe, Sattel zwischen Moschkogel und Hühnerstütze, etwas S über dem Sattel ca. 0,5 km E der Grillitschhütte, 46°48'55"N / 14°59'30"E, ca. 1760 m, GF 9155/4, Marmorausbisse am sanft geneigten N-Hang im Bereich der Waldgrenze, auf Moosen und Pflanzenresten, auf *Peltigera rufescens*, 17. VI. 2007, leg. J. Hafellner & L. Muggia (GZU). – Steiermark (Styria), [Steirisches Randgebirge], Grazer Bergland, Hochlantsch, Kalkrippe W über der Bärenschützklamm bei Mixnitz, S-exponiert, 1050–1100 m, GF 8658, auf Moosen, 1. V. 1972, leg. J. Poelt no. 11084 (GZU). – Steiermark (Styria), Steirisches Randgebirge, Stubalpe, Wölkerkogel oberhalb vom Alten Almhaus, Gipfelbereich, [47°04'50"N / 14°55'30"E], 1670–1706 m, GF 8955/2, grobkristalliner Marmor, auf Erde und Erdmoosen, 13. VIII. 1993, leg. A. Wilfling no. 2324, C. Unger & L. Unger (GZU). – Steiermark (Styria), [Steirisches Randgebirge], Grazer Bergland, S-exponierte Steilhänge des Gamskogel W von Kleinstübing, ca. 500 m, GF 8857, Kalkschrofen im lockeren *Pinus sylvestris*-Wald, auf saxicolen Moosen, 13. V. 1990, leg. J. Poelt (GZU). – Steiermark (Styria), [Steirisches Randgebirge], Grazer Bergland, Niederschöckl N von Graz, am Südwestgrat, 1200–1250 m, GF 8858, auf calcicolen Moosen, 6. XI. 1982, leg. J. Poelt (GZU). – Styria, Steirisches Randgebirge, Grazer Bergland, Gösser E von Arzberg, am W Rand der SW-exponierten Abbrüche, 47°15'00"N / 15°31'55"E, ca. 950 m, GF 8759, niedere Kalkschrofen an der Geländekante, auf Moosen und Pflanzenresten, 13. IX. 2009, leg. J. Hafellner no. 74081 (GZU). – Steiermark (Styria), [Steirisches Randgebirge], Grazer Bergland, Gösserwände E über der Raabklamm, E von Arzberg, 47°15'N / 15°32'E, 800–900 m, GF 8759, auf Moosen, 15. IV. 1994, leg. J. Poelt & A. Guttova (GZU). – Steiermark (Styria), Steirisches Randgebirge, Grazer Bergland, Raabklamm NW von Weiz, ca. 2 km ESE von Arzberg, unterste Abhänge des Gösser, am oberen Rand der Abbrüche der „Gamswand“ hoch über der „Gösserquelle“, 47°14'35"N / 15°32'38"E, ca. 600 m, GF 8759/3, S-exponierte, niedere Kalkschrofen unter dem Schirm eines lockeren Föhrenwaldes, auf bodennahen Neigungsflächen, auf *Collema fuscovirens*, 8. X. 2009, leg. J. Hafellner no. 74427 (GZU). – Steiermark (Styria), Steirisches Randgebirge, Grazer Bergland, Raabklamm NW von Weiz, ca. 1 km SW von Haselbach, 47°13'48"N / 15°33'25"E, ca. 600 m, GF 8759/3, am oberen Rand der W-exponierte Kalkabbrüche, auf Neigungsflächen niederer Schrofen über Moosen, 23. V. 2009, leg. J. Hafellner no. 73679 (GZU). – Steiermark (Styria), Steirisches Randgebirge, Grazer Bergland, Raabklamm NW von Weiz, ca. 2,1 km ESE von Arzberg, entlang des Steiges am linken Ufer in der Flußschlinge zwischen „Gamswand“ und „Enzianwand“, 47°14'30"N / 15°32'45"E, ca. 550 m, GF 8759/3, am Fuß der NW-exponierten Kalkfelswand, auf langfristig beschatteten, bergfeuchten, steilen Neigungsflächen über calcicolen Moosen, 8. X. 2009, leg. J. Hafellner no. 74501 (GZU). – Tirol (Tyrol), Nördliche Kalkalpen, Lechtaler Alpen, S-exponierte Schrofenhänge N und W der Augsburgener Hütte über Grins, NW Landeck, [47°10'10"N / 10°29'30"E], ca. 2200–2400 m, GF 8828, Kalk und Mergelkalk, auf Pflanzenresten, 9. VII. 1982, leg. H. Mayrhofer (GZU). – Tirol (Tyrol), Ötztaler Alpen, Bergsturzgebiet Forchet [NW von Sautens], nahe Bahnhof Ötztal, ca. 700 m, GF 8731, Dolomitrücken mit Erica-Föhrenwald, auf Moosen, 27. V. 1989, leg. J. Poelt (GZU). – Tirol (Tyrol), Stubai Alpen, Serles-Gruppe W ober Matrei am Brenner, Matreier Grube S ober Maria Waldrast, am Steig zum Kalbenjoch, 47°06'25"N / 11°23'05"E, ca. 2100 m, GF 8834/3, alpine Matten über Kalk, auf Moosen und Pflanzenresten, 1. VIII. 1996, leg. J. Hafellner no. 75505 (GZU). – Tirol (Tyrol), Osttirol, Nationalpark Hohe Tauern, Glockner-Gruppe, Teischnitztal N von Kals, untere NW-Hänge des Fiegerhorns, S ober der Teischnitzeben, 47°02'N / 12°40'15"E, ca. 2300 m, GF 8942/3, alpine Matten, auf Moosen und Pflanzenresten über Kalkschiefer, 16. VII. 1997, leg. J. Hafellner no. 46919 (GZU). – Tirol (Tyrol), Osttirol, Nationalpark Hohe Tauern, Glockner-Gruppe, Ködnitztal NE ober Kals, kurz N ober der Lucknerhütte, 47°02'35"N / 12°41'30"E, ca. 2300 m, GF 8942/3, niedere Kalkschieferschrofen und Rasen am Westhang, auf Moosen und Pflanzenresten, 4. IX. 1998, leg. J. Hafellner no. 46747 (GZU). – Tirol (Tyrol), Osttirol, Karnische Alpen, Porze SW von Obertilliach, am Fuß der Nordwand, [46°39'20"N / 12°34'05"E], ca. 2200 m, GF 9341/1, Kalkblöcke und Rasentreppen, auf Moosen und Pflanzenresten, 8. IX. 1989, leg. J. Hafellner no. 76439 & A. Hafellner (GZU). – Vorarlberg, Rätikon, Hänge zwischen Lünensee und Gafalljoch, ca. 14 km SSW von Bludenz, Geländerippe an den E-Abhängen der Kanzelköpfe, W gegenüber der Zollhütte, 47°02'35"N / 09°45'10"E, ca. 2150 m, GF 8924/4, kleine Kalkausbisse in zwergstrauchreichen Weiderasen, S-exponiert auf

Moosen und Pflanzenresten, 29. VIII. 2008, leg. J. Hafellner no. 73100 (GZU). – Vorarlberg: Allgäuer Alpen, Kleines Walsertal, Bärguntbachtal S von Baad, Innere Widdersteinalpe N der Bärgunthütte, 47°78'55"N / 10°07'05"E, ca. 1300 m, GF 8726/2, auf niederen Kalkblöcken in einer Viehweide, auf *Romjularia lurida*, 31. VIII. 1979, leg. J. Hafellner no. 41821 (GZU). – **Croatia**: Südlicher Velebit, felsige Hänge NNE oberhalb Podrag, E der Straße von Obrovac in N Richtung zum Mali Alan Pass, ca. 900 m, auf Moosen, 11. VI. 1973, leg. P. Döbbeler no. 1242 (GZU). – **France**: Insel Korsika, dept. Haut-Corse, Höhenrücken N der Serra di Pigno über Bastia, 900–940 m, 11. V. 1990, leg. H. Mayrhofer no. 9484 & J. Sattler (GZU). – **Germany**: Bayern (Bavaria), Nordalpen, Ammergauer Alpen (Ammergebirge), Tegelberg, ca. 5,5 km E von Füssen, W-Rücken, am Steig vom Tegelberghaus zur Marienbrücke, beim Tegelbergkopf, 47°33'30"N / 10°46'05"E, ca. 1520 m, Kalkschrofen und umgebender Fichtenwald, auf Moosen und Pflanzenresten, 4. IX. 2004, leg. J. Hafellner no. 79507 (GZU). – Bayern (Bavaria), Nordalpen, Chiemgauer Alpen, Kampenwand ca. 21 km SE von Rosenheim, am Westende des Felsriegels gegenüber vom Staffelstein, 47°45'21"N / 12°21'35"E, ca. 1510 m, an der Basis der Abbrüche, Triaskalk, auf Moosen und Pflanzenresten, 28. VIII. 2009, leg. J. Hafellner no. 79484 (GZU). – Bayern (Bavaria), Nordalpen, Chiemgauer Alpen, Kampenwand ca. 22 km SE von Rosenheim, S über der Steinlingalm, im Gratbereich W unter dem Gipfelkreuz, 47°45'20"N / 12°22'00"E, ca. 1640 m, am S-Fuß der Abbrüche des Gipfelaufbaus, Triaskalk, auf Moosen und Pflanzenresten, 28. VIII. 2009, leg. J. Hafellner no. 79404 (GZU). – Bayern (Bavaria), Nordalpen, Chiemgauer Alpen, Hochgern ca. 16 km SW von Traunstein, obersten N-Hänge knapp unter dem Gipfel, 47°45'04"N / 12°30'53"E, ca. 1700 m, niedere Kalkausbisse im Bereich der Waldgrenze, auf W-exponierten Neigungsfächen, auf *Collema spec.*, 27. VIII. 2009, leg. J. Hafellner no. 75184 (GZU). – Ibid., auf Moosen und Pflanzenresten, 27. VIII. 2009, leg. J. Hafellner no. 75168 (GZU). – Bayern, Oberbayern, W unterhalb der Schöfeldalmen über dem Spitzingsee, 1300–1400 m, auf *Romjularia lurida* in Spalten von Kalkblöcken, 2. VI. 1966, leg. J. Poelt no. 2961 (GZU). – **Greece**: Thessalia, Meteora Klöster, rechterhand der Straße vom Ort Kastraki in Richtung Meteora, Blockmeere und Felsen gegenüber dem Kloster Agios Nikolaos, c. 300–600 m, on *Romjularia lurida* (th.), 15. IX. 1989, leg. M. Matzer & B. Pelzmann (GZU, sub *Romjularia lurida*). – **Italy**: Piemonte, Prov. Cuneo, Alpi Cozie, on the ridge SE above Colle Valcavera, 44°22'30"N / 07°06'20"E, ca. 2470 m; cliffs of calcareous schist in alpine vegetation, on plant remnants on slope exposed to N, 23. VII. 2000, leg. J. Hafellner no. 75489 (with P. L. Nimis & M. Tretiach) (GZU). – Piemonte, Prov. Cuneo, Alpi Cozie, W ridge of Monte Nebin about 1 km E of Colle di Sampeyre, 44°32'40"N / 07°08'20"E, ca. 2380 m; outcrops of calcareous schists on slope exposed to the S, on low outcrops of calcareous schist, on plant remnants, 26. VII. 2000, leg. J. Hafellner no. 75617 (with P. L. Nimis & M. Tretiach) (GZU). – Valle d'Aosta, Prov. Aosta: Monte Bianco (Mont Blanc) group, Val Veny W of Courmayeur, ridge W above the Rifugio Elisabetta Soldini, 45°45'45"N / 06°50'15"E, ca. 2250 m; cliffs and boulders of jurassic limestone on slope exposed to the N, on plant remnants and bryophytes, 30. VII. 2001, leg. J. Hafellner no. 75430 (with P. L. Nimis & M. Tretiach) (GZU). – Trentino - Alto Adige, Südtirol, Überetsch, auf der Gleif über Eppan, auf Moosen über Porphyry, IV. 1966, leg. J. Poelt no. 1411 (GZU). – Veneto, prov. Belluno: Southern Alps, Venetian Alps, Nevegal SE of Belluno, Col Faverghera, area of the Orto Botanico, 46°05'00"N / 12°18'00"E, ca. 1540 m, low limestone outcrops and boulders in subalpine meadows, on bryophytes and plant debris, 31. VIII. 2002, leg. J. Hafellner no. 61103, 61107 (GZU). – Friuli - Venezia Giulia, Prov. Udine: Southern Alps, Carnic Alps, area of Passo Pramollo (Naßfeldpaß) ca. 6 km N of Pontebba, monte Carnizza (Garnitzenberg) E above the pass, limestone cliffs on the ridge W of the summit, 46°33'35"N / 13°17'36"E, ca. 1840 m, rocks of palaeozoic limestone, on plant remnants, 6. VIII. 2007, leg. J. Hafellner no. 76195 (GZU). – Friuli - Venezia Giulia, Prov. Udine, Südalpen, Karnische Alpen: Mt. Crostis Massiv N von Comeglians, S-Hänge des Mt. Neval, 46°33'50"N / 12°53'30"E, ca. 2000 m; alpine Matten, in moosigen Spalten niederer Schrofen, 17. VIII. 1994, leg. J. Hafellner no. 76926 (GZU). – Friuli - Venezia Giulia, Prov. Udine, Karnische Alpen, Paso del Pura NW von Ampezzo, Umgebung des Refugio (Albergo) Tita Piaz, [46°25'30"N / 12°44'30"E], ca. 1400 m, Buchen-Tannen-Fichtenwald mit Kalkblöcken, auf niederen Kalkblöcken über Moosen, 24. VII. 1993, leg. J. Hafellner no. 32552 (GZU). – Sardinia, prov. Nuoro, Barbagia Seulo, M. Arbo, Valle del Rio S. Girolamo, from the train station S. Girolamo to Casa Forestale, 39°51'N / 9°24'E, 900–1100 m, mixed forest, on plant remnants, 16. VII. 1987, leg. J. Poelt (GZU). – **Kosovo**: Bjeshkët e Nemuna e Kosovës (Albanian Alps), Rusulija, S of the summit on slopes exposed to SE, 42°44'12"N / 20°14'20"E, c. 2250 m alt.,

open rocky grassland above calcareous soil, 23. VIII. 2012, leg. H. Mayrhofer no. 19583a, H. Zekaj & F. Geci (GZU). – **Liechtenstein**: Eastern Alps, Rätikon, mountain ridge between Augstenberg and Nospitz, SSW above the village Malbun, S above Vaduzer Täli, 47°05'20"N / 09°36'15"E, elevation c. 2060 m, small cliffs of calcareous rock in alpine vegetation, on plant remnants, exposed to the N, 27. VIII. 2008, leg. J. Hafellner no. 72871 (GZU). – **Montenegro**: Bjelasica, National Park Biogradska Gora, summit of Troglava, 42°50'54"N/19°39'40"E, 2070 m, exposed calcareous rock outcrops, 21.VII.2005, leg. H. Mayrhofer no. 17768 & B. Knežević (GZU, sub *Catapyrenium cinereum*). – **Slovakia**: Carpati, montes Belanské Tatry, in valle „Holubyho dolina“, muscicola ad rupes calcareas, alt. 1300 m, 26. III. 1960, leg. A. Vězda (= Vězda, Lich. Sel. exs. 77) (GZU). – **Slovenia**: Southern Alps, Julian Alps, massif of Mangart NE of Bovec, on the Planinski mejni prehod (Mangart saddle), at the base of the rock faces of the mountain Travnik, 46°26'45"N / 13°39'20"E, c. 2100 m, alpine vegetation and rocks of limestone, on plant remnants, 5. VII. 2003, leg. J. Hafellner no. 75206 (GZU). – Southern Alps, Julian Alps, massif of Mangart NE of Bovec, slopes of large doline S of Mangartska koča (Mangart refuge), below Rdeča skala, 46°26'10"N / 13°38'45"E, c. 1880 m, alpine vegetation and rocks of bright (triassic) limestone, partly slightly siliciferous, on plant remnants, 5. VII. 2003, bzw. 2. VIII. 2003, leg. J. Hafellner no. 75330 (GZU). – **Sweden**: Södermanland Prov., Mörkö par., c. 2.3 km ENE of Mörkö church and c. 1 km NE of the croft Egelsvik, 59°00'N / 17°42'E, alt. c. 25 m, on shaded, mossy, vertical rock-faces, 29. IX. 1988, leg. G. Thor no. 7796 (= Lich. Sel. Exs. Upsal. 51) (GZU). – Gotland Prov., Hemse par., Hulte kruppar forest meadow, 0.5 km SSE Hemse church. 57°13'N / 18°22'E, grid: RUBIN 05J9b2a6d, on *Malus sylvestris*, 15–16.VIII.1990, leg. A. Nordin, R. Sundin & G. Thor no. 988 (= Lich. Sel. Exs. Upsal. 201) (GZU). – **Switzerland**: Kanton St. Gallen, St. Galler Oberland, Tannenbodenalp S über Unterterzen am Walensee, ca. 1500 m, Block einer Weidemauer, auf Pflanzenresten, 14. IX. 1968, leg. J. Poelt no. 6386 (GZU). – Kanton Graubünden: Urner Alps, Gotthard group, Oberalppass c. 6 km NE of Andermatt, shortly S above the pass, 46°39'20"N / 08°40'15"E, elevation c. 2100 m, outcrops of siliceous schist in alpine vegetation, on plant remnants on slope exposed to the N, 23. VIII. 2006, leg. J. Hafellner no. 75541 (GZU). – **ASIA: Armenia**: Vayots Dzor province, SE from Yeghegnadzor, c. 2 km NE turn towards the road leading to Noravank, 39°41.176'N / 45°13.488'E, c. 1380 m alt., big limestone boulders, on squamules of *Placidium rufescens*, 21. VII. 2006, leg. S. Harutyunyan 15-514 & H. Mayrhofer (GZU, sub *Placidium rufescens*). – **NORTH AMERICA: Greenland**: W-Grönland, Disko, Umgebung von Godhavn, Unteres Bläsedal NE von Godhavn, 50–100 m, 29. VII. 1982, leg. J. Poelt & H. Ullrich (GZU).

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Lichenized and lichenicolous fungi from the valley 'Ochsental' (Eastern Alps, Vorarlberg, Austria)

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BILOVITZ Peter Othmar & MAYRHOFER Helmut 2014: Lichenized and lichenicolous fungi from the valley 'Ochsental' (Eastern Alps, Vorarlberg, Austria). - *Fritschiana* (Graz) 78: 47–51. - ISSN 1024-0306

Abstract: A list of 100 lichen species and 4 lichenicolous fungi from the valley 'Ochsental' is presented. *Lecidea laboriosa* is new to Austria. *Lecanora swartzii*, *Orphniospora moriopsis*, *Protothelenella corrosa* and the lichenicolous fungus *Cercidospora stereocaulorum* are new to the province of Vorarlberg.

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Introduction

Vorarlberg, the westernmost province of Austria, covers an area of about 2,600 km². The most significant mountain ranges are the Rätikon, the Silvretta and the Verwall. Ochsental, a high alpine valley south of the mountain pass Bielerhöhe, is situated in the Silvretta mountain range (Fig. 1). The majority of the peaks in the Silvretta are elevated above three thousand meters and are surrounded by glaciers. There are two glaciers in the south end of the valley: the Vermunt and the Ochsentaler glacier. The latter is situated at the foot of the Piz Buin (3,312 m above sea level), the highest mountain of Vorarlberg, at the border to the Swiss canton of Graubünden. Due to the screening effect of the surrounding mountains, the climate of the valley is less oceanic than in many other parts of Vorarlberg. The bedrock consists of siliceous rocks, thus the soils have an acid character.

MAYRHOFER et al. (1989) provided a comprehensive list of 629 lichens and 21 lichenicolous fungi for Vorarlberg, as a result of the field meeting of the 'Bryological and Lichenological Association for Central Europe (BLAM)' in July 1986. Right after this meeting, the co-author together with Erika HINTEREGGER visited the valley 'Ochsental' for a one day excursion. HINTEREGGER (1994) recorded 20 lichen species on the stems of *Rhododendron ferrugineum* from this valley, including the saxicolous species *Bellemeria cinereorufescens*, *Lecanora cenisia*, *L. polytropa*, *L. subintricata*, *Rhizocarpon geographicum*, *R. grande* and *R. polycarpum*. The results of the field trip – not including the records published in HINTEREGGER (1994) – are presented in this paper.

A compilation of the lichens of Vorarlberg was presented by PFEFFERKORN-DELLALI & TÜRK (2005), listing 1069 lichen taxa based on literature data and field work. Since then, only a few additions have been published, of which KAUFMANN (2013) is the most comprehensive one.

Material and methods

Sampling location: Austria, Vorarlberg, Silvretta mountain range, valley 'Ochsental' south of 'Bielerhöhe', 46°52'26"–46°53'28"N, 10°05'40"–10°06' 26"E, 2100–2200 m above sea level, collected by Helmut MAYRHOFER, 31 July 1986.

Lichens were collected on plant debris or decaying terricolous mosses (deb), on silicious rocks (sil), on acid soil (ter-sil) and, exceptionally, on dead wood (xyl).

The specimens were identified with the aid of WIRTH et al. (2013) and IHLEN & WEDIN (2008), using routine light microscopy techniques. Some of the identifications required verification by using standardized thin-layer chromatography (TLC), following the protocols of WHITE & JAMES (1985) and ORANGE et al. (2001). The specimens are preserved in the herbarium of the Institute of Plant Sciences, University of Graz (GZU). The nomenclature mainly follows WIRTH et al. (2013), or other modern treatments.



Fig. 1. Location of the valley "Ochsental" in Austria

Results and discussion

Lichenized fungi

Acarospora badiofusca: sil
Acarospora fuscata: sil
Alectoria ochroleuca: ter-sil
Amandinea punctata: deb
Arthrorhaphis citrinella: on *Baeomyces rufus*
Aspicilia simoensis: sil
Baeomyces placophyllus: ter-sil
Baeomyces rufus: ter-sil
Bellemerea alpina: sil
Brodoa intestiniformis: sil
Bryonora castanea: deb

Caloplaca ammiospila: deb
Calvitimela armeniaca: sil
Candelariella vitellina: sil
Catolechia wahlenbergii: ter-sil
Cetraria ericetorum: ter-sil
Cetraria islandica: ter-sil
Cetraria muricata: ter-sil
Cladonia arbuscula subsp. *squarrosa*:
ter-sil
Cladonia chlorophaea: ter-sil
Cladonia cf. *furcata*: ter-sil
Cladonia gracilis: ter-sil

Cladonia pyxidata: ter-sil
Cladonia rangiferina: ter-sil
Cladonia stellaris: ter-sil
Cladonia uncialis: ter-sil
Cornicularia normoerica: sil
Dimelaena oreina: sil – chemotype I
(with fumarprotocetraric acid)
Diploschistes scruposus: sil
Epilichen scabrosus: on *Baeomyces placophyllus*
Flavocetraria cucullata: ter-sil
Flavocetraria nivalis: ter-sil
Fuscidea kochiana: sil
Helocarpon pulverulum: deb
Icmadophila ericetorum: deb
Lecanora bicincta: sil
Lecanora intricata: sil
Lecanora polytropa: sil
Lecanora rupicola: sil
Lecanora swartzii: sil – **new to Vorarlberg**
Lecidea fuscoatra: sil
Lecidea laboriosa: sil – **new to Austria**
Lecidea lactea: sil
Lecidea lapicida: sil
Lecidea silacea: sil
Lecidoma demissum: ter-sil
Lobaria linita: ter-sil
Melanelia hepatizon: sil
Melanelia stygia: sil
Micarea lignaria: deb
Miriquidica garovaglii: sil
Ophioparma ventosa: sil
Orphniospora moriopsis: sil – **new to Vorarlberg**
Parmelia omphalodes: sil
Parmelia saxatilis: sil
Parmeliella triptophylla: deb, sil
Peltigera leucophlebia: ter-sil
Pertusaria corallina: sil
Placynthiella oligotropha: deb
Pleopsidium chlorophanum: sil
Porpidia crustulata: sil

Porpidia macrocarpa: sil
Porpidia tuberculosa: sil
Protomicarea limosa: ter-sil
Protopannaria pezizoides: ter-sil
Protoparmelia badia: sil
Protothelenella corrosa: sil – **new to Vorarlberg**
Protothelenella sphinctrinoides: deb
Pseudephebe pubescens: sil
Psorinia conglomerata: sil
Psoroma hypnorum: ter-sil
Pycnothelia papillaria: ter-sil
Ramalina capitata: sil
Rhizocarpon copelandii: sil
Rhizocarpon geographicum: sil
Rhizocarpon lecanorinum: sil
Rhizocarpon polycarpum: sil
Rhizocarpon superficiale: sil
Rhizoplaca chrysoleuca: sil
Rhizoplaca melanophthalma: sil
Rimularia furvella: on *Fuscidea kochiana*
Rimularia gibbosa: sil
Rinodina conradii: deb
Rinodina mniaraea var. *mniaraea*: ter-sil
Schaereria fuscocinerea: sil
Solorina crocea: ter-sil
Sporastatia testudinea: sil
Stereocaulon alpinum: ter-sil
Tephromela atra: sil
Thamnolia vermicularis: ter-sil
Trapeliopsis granulosa: deb, ter-sil
Tremolecia atrata: sil
Umbilicaria crustulosa: sil
Umbilicaria cylindrica: sil
Umbilicaria deusta: sil
Umbilicaria leiocarpa: sil
Umbilicaria vellea: sil
Varicellaria lactea: sil
Xanthoria elegans: sil
Xylographa parallela: xyl

Lichenicolous fungi

Cercidospora stereocaulorum: on *Stereocaulon* sp. – new to Vorarlberg

Dactylospora urceolata: on *Protothelenella sphinctrinoides*

Muellerella pygmaea: on *Lecidea lapicida*

Rhagadostoma lichenicola: on *Solorina crocea*

A one day excursion to the valley 'Ochsental', situated in the Silvretta mountain range, yielded 100 lichen species and 4 lichenicolous fungi. All lichens found on *Rhododendron ferrugineum* were published earlier by HINTEREGGER (1994).

Lecidea laboriosa is new to Austria. In the Alps, this species was previously only recorded from the canton Valais in Switzerland (CLERC & TRUONG 2012). Because of the similarity to *Lecidea plana*, some specimens are probably filed under that species. HERTEL (1995) presumed that *Lecidea laboriosa* is heterogeneous.

Lecanora swartzii, *Orphniospora moriopsis*, *Protothelenella corrosa*, and the lichenicolous fungus *Cercidospora stereocaulorum* on *Stereocaulon* sp. are new to the province of Vorarlberg.

The majority of the lichenized species (58) was collected on siliceous rocks. Twenty-nine species occurred on acid soil, eleven species on plant debris or decaying terricolous mosses. *Arthrorhaphis citrinella*, *Epilichen scabrosus* and *Rimularia furvella* grew on other lichens and *Xylographa parallela* on a dead stem of a dwarf-shrub.

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