Distributional and other data for some species of *Didymocyrtis* (Dothideomycetes, Pleosporales, Phaeosphaeriaceae), including their *Phoma*-type anamorphs

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Abstract: Treatments of ten species of *Didymocyrtis* and one of *Polycoccum* are presented. The new combinations *Didymocyrtis physciae* (Brackel) Hafellner and *Polycoccum stellulatae* (Vouaux) Hafellner are proposed. *Didymocyrtis cladoniicola* is newly recorded for Albania, Austria, Romania, Sweden, and Armenia, as is *D. foliaceiphila* for the Kosovo, *D. melanelixiae* for Austria, *D. pseudeverniae* for Austria and France, as well as *Polycoccum stellulatae* for Uruguay and the Juan Fernandez Islands (to Chile).

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Introduction

Körber (1865) described the genus *Polycoccum* Körb. (type *Polycoccum sauteri* Körb., a heterotypic synonym of *P. trypethelioides*), where most of the lichenicolous paraphysate fissitunicate phaeodidymosporous pyrenomycetes are currently classified. Whereas *Polycoccum* was little used for lichenicolous ascomycetes until its re-installation by Santesson (1960), *Polycoccum* has become one of the species-rich genera in the last two decades, with further species described almost every year. In the meantime, Mycobank (http://www.mycobank.org) lists more than 70 taxa names on species level and below which have to be considered and in the synopsis of lichenicolous fungi by Lawrey & Diederich (2015) after the seggregation of *Didymocyrtis* Vain. still 53 species are accepted in *Polycoccum*.

A first key to species of *Polycoccum* was designed by Vězda (1969). The most comprehensive key so far available is the one compiled by Hawksworth & Diederich (1988, 23 species worldwide), whereas regional keys (e.g. Atienza et al. 2003, 13 species from Spain; Calatayud 2004, 5 species from

Sonoran desert region; Ihlen & Wedin 2008, 14 species from Sweden) depict the diversity in smaller areas.

In historic catalogues of lichenicolous fungi from the 19th century, if any, only a few species are treated in *Polycoccum* (e.g. by Arnold 1874a, 1877, 1881, 1895). Other species now included in *Polycoccum* were previously classified in different genera, namely in *Microthelia* Körb. (type *Microthelia micula* Körb.) and *Endococcus* Nyl. (type *Endococcus rugulosus* (Borrer ex Leight.) Nyl.) (compare e.g. Arnold l.c., Lindsay 1869). Vouaux (1913) treated most *Polycoccum* species in *Didymosphaeria* Fuckel nom. cons. (type: *Didymosphaeria epidermidis* "(Fr.) Fuckel" with conserved type, heterotypic synonym of *Didymosphaeria futilis* (Berk. & Broome) Rehm, see also Holm 1957, Scheinpflug 1958), whereas Keissler (1930) included *Polycoccum* species partly in *Didymosphaeria*, partly in *Discothecium* Zopf (type *Discothecium stigma* (Körb.) Zopf, hence a heterotypic synonym of *Endococcus* Nyl.).

Higher level classification of all these genera remained rather formalistic until the mid 20th century. With the discovery of the ascohymenial and ascolocular ascoma development types and the ascus wall types (including the fissituincate = "bitunicate" one), additional phenotypic characters became available for ascomycete systematics. The inclusion of these new characters had a high impact on the taxonomy of ascomycetes on family and order level. The "classical" taxonomic treatments by Luttrell (1973), Arx & Müller (1975), Barr (1979) and Eriksson (1981) were firmly based on these additional character complexes, providing a kind of baseline for the taxonomy of loculoascomycetes. One of the generally accepted higher level taxa is the clade Pleosporales/Pleosporaceae. However, genera introduced for lichenicolous fungi were considered only occasionally. For the lichenicolous genera, the comprehensive listing in the "Outline of the Ascomycetes" initiative (Eriksson & Hawksworth 1986, etc.) was an important step forward and also brought up a forum of discussion for proposed placements.

Whereas Eriksson & Hawksworth (1986) had classified *Polycoccum* in the Pleosporaceae Nitschke, Crivelli (1983: 193) supposed a closer relationship between *Dacampia* A.Massal. (type *Dacampia hookeri* (Borrer) A.Massal.), *Polycoccum* and *Pyrenidium* Nyl. (sub *Dacampiosphaeria* D.Hawksw.) (type: *Pyrenidium actinellum* Nyl. / *Dacampiosphaeria rivana* (De Not.) D.Hawksw., a heterotypic synonym of *P. actinellum*). This view was further elaborated by Hawksworth & Diederich (1988), when they proposed to treat these three genera together with *Byssothecium* Fuckel (type: *Byssothecium circinans* Fuckel), *Clypeococcum* D.Hawksw. (type: *Clypeococcum cladonema* (Wedd.) D.Hawksw.) and *Weddellomyces* D.Hawksw. (type: *Weddellomyces epicallopisma* (Wedd.) D.Hawksw.) in the family Dacampiacae Körb. (syn. Pyrenidiacae Zahlbr., for a phenotypic circumscription of the taxon compare Cannon & Kirk 2007). Of these, *Clypeococcum* is also didymosporous, but the ascomata are clypeate.

As long as sequence data of lichenicolous fungi were still scarce, fungi of this ecological niche were not representatively included in cladograms based on molecular data sets (see e.g. Lutzoni et al. 2004, Schoch et al. 2006,

2009, Zhang et al 2009, Hyde et al. 2013). Therefore the placement of *Polycoccum* in the Dacampiaceae remained uncertain until recently, as well as the placement and circumscription of this family.

On the other hand, the question whether *Polycoccum* is homogenous or does contain non-congeneric elements, never got serious attention. The only generic name listed as a synonym of *Polycoccum* is *Lophothelium* Stirt., Scottish Naturalist 9: 37, 1887). The type is *Lophothelium acervatum* Stirt., sec. descr. a heterotypic synonym of *Polycoccum trypethelioides*, and the generic name *Lophothelium* is therefore not available for any divergent elements.

Recently, however, it was shown by morphological and molecular studies (Ertz et al. 2015) that at least one species group, the *Polycoccum bryonthae* group, is only distantly related to the core group of *Polycoccum*. For this segregate of *Polycoccum*, the generic name *Didymocyrtis* Vain. (Phaeosphaeriaceae) was re-installed, a genus practically neglected since its introduction (Vainio 1921). Furthermore it was demonstrated that *Polycoccum* s.str. does not belong to the Dacampiacae, where it was traditionally classified, but has to be placed in a family of its own, the Polycoccaceae, and outside the Pleosporales.

Several *Didymocyrtis* species proved to develop *Phoma* anamorphs during their life cycle. *Phoma caloplacae* represents a coelomycetous anamorph of *Didymocyrtis consimilis*, *Phoma ficuzzae* that of *D*. *ramalinae*, *Phoma denigricans* most likely that of *D*. *bryonthae*, and a *Phoma* with narrowly ellipsoid conidia that of *Didymocyrtis slaptoniensis*. Some *Didymocyrtis* species are so far only known by their *Phoma*-like anamorphs.

The presently available specimen data of both the teleomorphs and the proven or supposed anamorphs of *Didymocyrtis* species suggest a bipolar extratropical distribution pattern with a centre of diversity in the Holarctic.

As space for specimen data was limited in our taxonomic treatment (Ertz et al. 2015), detailed distribution data and additional observations on the autecology of the currently recognized *Didymocyrtis* species are published here, in order to give a more complete picture of these lichenicolous fungi.

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, 6.4–40×). Anatomical studies of the thallus and the ascomata were carried out under the light microscope (Leica DMRE, partly Leitz Biomed, 100–1000×). 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). Measurements refer to dimensions in tap water.

Abbreviations for institutional herbaria follow Holmgren et al. (1990). Abbreviations of nomenclatural authorities are those proposed by Brummitt & Powell (1992). Geographic units are defined and named according to Hollis & Brummitt (1992) or Brummitt (2001), resp. The nomenclature of lichenised taxa follows Hafellner & Türk (2001).

Abbreviations: ap. – apothecia, th. – thallus, T – host of the type specimen

In addition to the specimens cited together with the treatments of the species, the following material was also examined for comparison:

Briancoppinsia cytospora (Vouaux) Diederich, Ertz, Lawrey & P.Boom

Austria: Steiermark (Styria), Nordalpen, Dachstein-Gruppe, Ramsau 4.6 km NNW of Schladming, 1 km N of the church of the village Ramsau am Dachstein, N of the farm Feldlhof, 47°25’39’’N / 13°39’09’’E, c. 1190 m alt., GF 8547/4, solitary trees in a meadow along a gravel road, on bark of *Acer pseudoplatanus*, on *Parmelia sulcata* (th.), II. 2007, leg. W. Obermayer 12631 (GZU). – Steiermark (Styria), Nördliche Kalkalpen, Ennstaler Alpen, Gesäuseberge S von Admont, Umgebung der Sieglalm ca. 1 km N vom Schloß Kaiserau, 47°32’20’’N / 14°29’00’’E, ca. 1120 m, GF 8452/4, montaner Forst mit dominanter Picea abies, auf Borke von Abies alba, auf *Hypogymnia physodes* (th.), 13. IX. 2006, leg. J. Hafellner, bzw. 29. VII. 2007, leg. J. Hafellner no. 69998 & L. Muggia (GZU). – **Sweden**: Uppland, Österlövsta par., Lövstabruk ca. 5 km SE of Österlövsta, just E of the castle, 60°24’30”N/17°58’30”E, alt. ca. 20 m; open mixed forest; on bark of Ulmus, on *Parmelia sulcata* (th.), 10. V. 1996; leg. J. H. no. 37371 (Hafellner).

Dacampia engeliana (Saut.) A.Massal.

Hosts: *Solorina saccata* (th.) (1), *Solorina octospora* (th.) (2), *Solorina* spec. (th.) (3)

Austria: Kärnten (Carinthia), Hohe Tauern, Goldberggruppe, Umgebung der Sadnig-Hütte, 1930–2000 m, GF 9043, auf Rohhumus/Moosen über Schiefer, (3), 2. VII. 1989, leg. R. Türk no. 13128, 13156 (GZU). – Kärnten (Carinthia), Gailtaler Alpen, N-seitige Abbrüche der Jaukenhöhe [am W-Rücken unter dem Jaukenstöckl, 46°42’05’’N / 13°03’00’’E], ca. 2000 m, GF 9244/3, 16. VII. 1978, leg. J. Hafellner no. 3869 (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 firmae-Fragmente, in Gratnähe auf Erde in Felsspalten, (3), 21. VII. 2009, leg. J. Hafellner no. 76081 (GZU). – Kärnten (Carinthia), Zentralalpen, Saualpe W von Wolfsberg, Gertrusk, im Kar E unter dem Gipfel, 46°51’45’’N / 14°38’50’’E, ca. 1900 m, GF 9153/2, niedere Felsausbisse aus glimmerreichem Marmor umgeben von Zwergstrauchheiden, in grusgefüllten Felsfugen, (3), 9. X. 2010, leg. J. Hafellner no. 76303 & L. Muggia (GZU). – Kärnten (Carinthia), Zentralalpen, Saualpe W von Wolfsberg, Gertrusk, im Kar E unter dem Gipfel, N unterhalb der Meeraugen, 46°51’40’’N / 14°39’00’’E, ca. 1860 m, GF 9153/2, Klippe aus Kalkschiefer mit NW-exponierten Abbrüchen am Rand eines Grünerlenbestandes, auf Erde in Felsspalten, (3), 9. X. 2010, leg. J. Hafellner no. 76274 & L. Muggia (GZU). – Kärnten (Carinthia), [Südalpen], Karnische Alpen, Bergmassive SW von Kötschach-Mauthen, kurz N unter dem Giramondopaß am Abstieg zur Oberen Wolayer Alm, 46°37’45’’N / 12°50’05’’E, ca. 1900 m, GF 9343/3, alpine Matten mit zerstreuten Schieferblöcken / Kalkblöcken, auf Moosen und Pflanzenresten über Kalkblöcken, (3), 15. VII. 1998, leg. J. Hafellner no. 45804 (GZU). – Kärnten (Carinthia), Karawanken, Koschuta, Umgebung des Koschutahauses S von Zell-Pfarre, [46°27’10’’N / 14°23’20’’E], 1250–1300 m, GF 9552/1, Tannen-Fichtenwald an Dolomitblöcken, (1), 19. X. 1984, leg. J. Hafellner no. 11741 (GZU). – Kärnten (Carinthia), Karawanken, Hochobir-Massiv NE von Eisenkappel, am Südgrat knapp unter dem Gipfel, ca. 2100 m, 46°30’15’’N / 14°29’15’’E, GF 9452/4, niedere Kalkschrofen am Rand der westseitigen Abbrüche, in Erdfugen, (3), 16. VII. 1998, leg. J. Hafellner no. 45673 (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 kleinen Erdanrissen, 29. VI. 1997, leg. J. Hafellner no. 42108 (herb. Hafellner). – Steiermark (Styria), Eisenerzer Alpen, Eisenerzer Reichenstein, Weg durch das Grübl, N-Fuß der Abbrüche des Reichensteins, 1700–1800 m, GF 8455/4, (3), 12. X. 1988, leg. J. Poelt (GZU). – Steiermark (Styria), Hochschwab-Gruppe, am Plateau des Pfaffenstein NE über Eisenerz, etwas E des Gipfelkreuzes, ca. 1860 m, GF 8455/1, Kalkfelsspalten, (3), 5. VIII. 1989, leg. M. Matzer no. 50 & B. Pelzmann (GZU). – Steiermark (Styria), Nördliche Kalkalpen, Hochschwab-Gruppe, Klamm NE von Oberort-Tragöß, [47°33’50’’N / 15°04’00’’E], ca. 840 m, GF 8456/1, (1), 15. VIII. 1976, leg. J. Hafellner no. 1823 (GZU). – Steiermark (Styria), Hochschwab-Gruppe, Endriegelgraben NE vom Wirtshaus Schwabenbartl, N von Aflenz, 820–950 m, GF 8457, Abbrüche aus Hauptdolomit, (1), 6. VI. 1993, leg. J. Poelt no. 93/76 (GZU). – Steiermark (Styria), Nördliche Kalkalpen, Mürzsteger Alpen, Veitsch Alpe, Großer Wildkamm, am SE-Grat ober der Gingatzwiese, ca. 1850 m, 47°39’40’’N / 15°24’30’’E, GF 8358/1, Kalkschrofen mit Caricetum firmae-Fragmenten, auf Moosen und Pflanzenresten, (3), 17. V. 1997, leg. J. Miadlikowska & J. Hafellner no. 42630 (GZU). – Steiermark (Styria), Niedere Tauern, Wölzer Tauern, Gipfel des Schreinl [E über Donnersbachwald, 47°22’50’’N / 14°10’05’’E], ca. 2150 m, GF 8651/1, N-seitig über niederen Schrofen aus Ca-hältigem Schiefer, in erdgefüllten Felsspalten, (3), 21. VII. 1989, leg. J. Hafellner no. 29974 (GZU). – Steiermark, 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, in Felsspalten, (3), 26. VII. 1985, leg. J. Hafellner no. 14090 (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 Erdblößen, (1), 12. XI. 2000, leg. J. Hafellner no. 53329 (GZU). – Steiermark, Steirisches Randgebirge, Grazer Bergland, Plankogel S über Gasen, ca. 10 km W von Birkfeld, kurz N unterhalb vom Gipfel, 47°21’20’’N / 15°33’30’’E, ca. 1500 m, GF 8659/1, kleine Felsen aus paläozoischem Kalkschiefer an der Waldgrenze, in erdgefüllten Felsspalten, (1), 11. XII. 2004, leg. J. Hafellner no. 63921 (GZU). – Tirol, Stubaier 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 Erdblößen, (3), 1. VIII. 1996, leg. J. Hafellner no. 75521 (GZU). – Tirol (Tyrol), Osttirol, Virgental, Weg von der Sajat-Hütte zur Heinrich-Hütte, 2300 m, (3), 22. VII. 1982, leg. R. Türk (GZU). – Tirol (Tyrol), Osttirol, Nationalpark Hohe Tauern, Glockner-Gruppe, Teischnitztal N von Kals, untere NW-Hänge des Fiegerhorns, SW ober der Teischnitzeben, 47°02’N / 12°39’40’’E, ca. 2200 m, GF 8941/4, alpine Matten, auf Erdblößen über Kalkschiefer, (3), 16. VII. 1997, leg. J. Hafellner no. 46909 (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 Erdblößen über Kalkschiefer, (3), 16. VII. 1997, leg. J. Hafellner no. 46748 (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, (3), 4. IX. 1998, leg. J. Hafellner no. 46748 (GZU). – Tirol (Tyrol), Osttirol, Nationalpark Hohe Tauern, Glockner-Gruppe, Ködnitztal NE ober Kals, kurz S ober der Pfortschscharte hoch E ober der Lucknerhütte, 47°02’35’’N / 12°42’20’’E, ca. 2840 m, GF 8942/3, niedere, E-exponierte Kalkschieferschrofen, auf kleinen Erdblößen, (3), 4. IX. 1998, leg. J. Hafellner no. 46662 (GZU). – Vorarlberg, Rätikon, Hänge zwischen Lünersee 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, auf Erde in N-exponierten Felsspalten, (1), 29. VIII. 2008, leg. J. Hafellner no. 73124 (GZU).

Dacampia hookeri (Borrer) A.Massal.

Hosts: *Solorina saccata* (th.) (1), *Solorina bispora* (th.) (2), a whitish, crustose, slightly effigurate thallus representing a modified thallus of *Solorina* spec. (3)

Austria: Kärnten (Carinthia), Gailtaler Alpen, Reißkofel ca. 11 km E von Kötschach-Mauthen, am Steig von der Reißkofel-Biwakschachtel entlang des W-Grates zum Gipfel, in den Nordhängen am Fuß des Gipfelaufbaus des W Vorgipfels, 46°41’15’’N / 13°08’33’’E, ca. 2190 m, GF 9344/2, N-exponierte Abbrüche (Triaskalk) und Caricetum firmae-Fragmente, auf Erdblößen auf einer Geländerippe, (3), 21. VII. 2009, leg. J. Hafellner no. 76063 & A. Hafellner (GZU). – Kärnten (Carinthia), [Südalpen], 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, in erdgefüllten Felsspalten, (3), 18. VII. 2007, leg. J. Hafellner no. 76139 (GZU). – Kärnten (Carinthia), Karnische Alpen, Gartnerkofel ca. 8 km SW von Hermagor, auf dem westlichen Seitengipfel, 46°34’20’’N / 13°18’15’’E, ca. 2180 m, GF 9445/2, Ausbisse aus Triaskalk in alpinen Rasen, auf Erdblößen, (1), 1. IX. 2007, leg. J. Hafellner no. 75838 (GZU). – Kärnten (Carinthia), Karawanken, Rücken der Petzen, S über Bleiburg, W des Kniepssattels („Knirpssattel“), [46°30’15’’N / 14°46’05’’E], ca. 2100 m, GF 9454/4, Kalk, (3), 11. VIII. 1991, leg. 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 Erde in Felsspalten, (3), 5. VI. 2010, leg. J. Hafellner no. 75706 (GZU). – Salzburg (Salisbury), Brennkogel S vom Fuschertörl an der Großglocknerstraße, Gipfelbereich, 3018 m, GF 8942, (3), 12. VII. 1987, leg. C. D. Meurk (GZU). – Salzburg (Salisbury), 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, kalkhältige Glimmerschieferblöcke auf einem steilen Westhang, auf Erdblößen, (3), 10. VIII. 1994, leg. J. Hafellner no. 33243 (GZU). – Salzburg (Salisbury), Nationalpark Hohe Tauern, Ankogel Gruppe, knapp N unter dem Westgrat des Greilkopf E ober der Hagener Hütte, [47°01’40’’N / 13°05’40’’E], ca. 2440 m, GF 8944/4, alpine Matten über Kalkschiefer, über Erdblößen, (3), 27. VIII. 1994, leg. J. Hafellner no. 33046 (GZU). – Steiermark (Styria), [Nördliche Kalkalpen], Dachstein-Gruppe, Ramsau, Weg von der Dachsteinsüdwandhütte in Richtung Hunerscharte, unterhalb des Scheiblingsteins, ca. 1900–2000 m, GF 8547/2, (3), 7. VIII. 1993, leg. J. Poelt no. 93-415 & M. Grube (GZU). – Steiermark (Styria), Nördliche Kalkalpen, Totes Gebirge, zwischen Vorderem und Hinterem Lahngangsee NE ober Gößl, 47°40’25’’N / 13°56’05’’E, ca. 1500 m, GF 8349/2, sehr lockerer Lärchenwald über Kalk, auf Erdblößen, (3), 20. VIII. 1988, leg. J. Hafellner no. 50430 , M. Matzer & A. Hafellner (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, in ergefüllten Felsspalten, (3), 3. X. 2010, leg. J. Hafellner no. 76208 (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 Materialseilbahn, 47°38’40’’N / 15°24’40’’E, ca. 1790 m, GF 8358/3, N-exponierte schrofige Steilhänge, Wettersteinkalk (Trias), in erdgefüllten Felsspalten, (3), 5. VI. 2005, leg. J. Hafellner no. 71285 (GZU). – Tirol (Tyrol), Lechtaler Alpen, NW Landeck, Schrofenhange N und W der Augsburger Hütte über Grins, 2200, GF 8828, (3), 9. VII. 1982, leg J. Poelt (GZU). – Tirol (Tyrol), Karwendel-Gebirge, Hänge am Weg von der Lamsenjochhütte („Lamsenhütte“) zum Westl. Lamsenjoch („Lamsjoch“), 2000–2200 m, GF 8635, (3), 15. VIII. 1981, leg. J. Poelt (GZU). – Tirol (Tyrol), Stubaier 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 Erdblößen, (3), 1. VIII. 1996, leg. J. Hafellner no. 75522 (GZU).

Didymosphaeria futilis (Berk. & Broome) Rehm

Austria: Steiermark, [Steirisches Randgebirge], Grazer Bergland, NW von Gratwein, bei Stift Rein, Mühlbachgraben, 400–600 m, auf Calamagrostis varia, 11. VI. 1983, leg. D. Kores, confirm. A. Aptroot (GZU). – Steiermark, [Steirisches Randgebirge], Grazer Bergland, Umgebung von Kreuzberg N von Graz, Mischwald, auf Rugus dumetorum coll., 14. XI. 1982, leg. W. Maurer & J. Poelt, det. J. Poelt, confirm. A. Aptroot (GZU).

Didymosphaeria conoidea Niessl

Austria: Salzburg, Hohe Tauern, Lungau, Rotgüldensee, auf *Laserpitium latifolium* in alten Fruchtkörpern von *Leptosphaeria doliolum*, VII. 1981, leg. J. Poelt, det. H. Hager, confirm. A. Aptroot (GZU). – Salzburg, Lungau, Radstädter Tauern, Riedingschafte W vom Weißeck, oberhalb der Stickler Alm, 2275 m, Caricetum curvulae, auf *Carex atrata* Blättern in alter *Pleospora graminarearum*, 23. VII. 1982, leg. C. Scheuer (GZU).

Polycoccum thrypethelioides (Th.Fr.) R.Sant.

Austria: Kärnten (Carinthia), Nationalpark Hohe Tauern, Glocknergruppe, Pasterzenvorfeld, ca. 2300 m, GF 8942, auf Sand, auf *Stereocaulon* spec. (th.), 16. VII. 1980, leg. R. Türk 7332 (GZU). – Tirol, Samnaun-Gruppe, Furgler W ober Serfaus, am Grat zwischen dem Furgler Joch und dem Gipfel, 2800–2900 m, GF 8929, Gneisfelsen und alpine Matten und Windheiden in Windheiden im unteren Teil des Grates, auf Rohboden, auf *Stereocaulon* spec. (th.), 2. IX. 1991, leg. J. Hafellner 30184 (herb. Hafellner). – **Sweden**: Torne Lappmark, Westufer des Rensjö bei Station Rensjön, ca. 480 m, auf *Sterecaulon* spec. (th.), 2. VIII. 1972, leg. J. Poelt 11947 (GZU). – Torne Lapmark, Torneträsk area, Vassitjåkko, the NE slope, ca. 1000 m, on a wind-swept heath on calcareous ground, on *Stereocaulon alpinum* (th.), 16. VIII. 1948, leg. R. Santesson = Santesson, Fungi Lichenicoli exs. 34 (GZU). – Torne Lapmark, Jukkasjärvi sn, Umgebung von Abisko, Birkenwälder um die Naturvetensk. Station, 68°21'N / 18°49'E, ca. 380 m, auf *Stereocaulon incrustatum* (th.), 4. VIII. 1980, leg. J. Poelt (GZU). – **Greenland**: W-Grönland, Disko, Lyngmark, untere Hänge des Lyngmarkfjeld N Godhavn, Basalt, 50–320 m, auf *Stereocaulon* spec. (th.), VII. 1983, leg. J. Poelt & H. Ullrich (GZU). – W-Grönland, Disko, auf Basalt kurz N der Arktischen Station Godhavn, , 20–50 m, auf *Stereocaulon* spec. (th.), 30. VII. 1983, leg. J. Poelt & H. Ullrich (GZU).

Polycoccum rubellianae Calat. & V.Atienza

Italy: Südtirol, Porphyr ober Gries bei Bozen, auf *Caloplaca rubelliana* (th.), IX. 1870, leg. F. Arnold (M).

Results

Didymocyrtis Vain., Acta Soc. Fauna Flora Fenn. 49(2): 221, 263 (1921).

Type: *Didymocyrtis consimilis* Vain. (lectotype, selected by Ertz et al. 2015).

= *Diederichia* D.Hawksw., Lichenologist 35: 206 (2013).

Type: *Diederichia pseudeverniae* (Etayo & Diederich) D.Hawksw. (*Macrophomina pseudeverniae* Etayo & Diederich) (holotype)

= *Diederichomyces* Crous & Trakunyingcharoen in Trakunyingcharoen et al., IMA Fungus 5(2): 393 (2014).

Type: *Diederichomyces xanthomendozae* (Diederich & Freebury) Crous & Trakunyingcharoen (*Phoma xanthomendozae* Diederich & Freebury) (holotype)

Full descriptions: teleomorph: Ertz et al. 2015: 65; Vainio 1921: 221; anamorph: Trakunyingcharoen et al., IMA Fungus 5(2): 393, 400 (2014); Ertz et al. 2015: 65.

Key to species: Ertz et al. 2015: 65–66.

Notes: 1. Until recently *Didymocyrtis* Vain. was a widely neglected genus. The genus was reinstalled for some polycoccoid lichenicolous fungi, all with +/- slender, +/- narrowly cylindrical, fissitunicate asci with relatively thin lateral ascus walls and (compared to true *Polycoccum* species) thin-walled, middle-brown ascospores in an +/- uniserial arrangement inside the asci. In a phylogenetic reconstruction based on sequence data, these species formed a clade in Pleosporales-Phaeosphaeriaceae (Ertz et al. 2015).

2. On the other hand, the core group of *Polycoccum* (generic type: *P. trypethelioides*) can be easily distinguished by broadly cylindrical asci and by the thick-walled, often distinctly ornamented ascospores in a +/– biserial arrangement inside the asci. Further characters of *Polycoccum* s.str. are the formation of ascomata on vegetative host tissue with a tendency to induce the formation of galls, as well as certain features of the ascomatal wall (cells +/– isodiametric in longitudinal section), hamathecium (consisting of relatively thick paraphysoids) and ascus wall (thick both laterally and apically) In a phylogenetic reconstruction based on sequence data, *Polycoccum* species formed a clade outside Pleosporales (Ertz et al. 2015).

3. Based on the phenotypic characters, *Didymocyrtis* keys out in Pleosporaceae (Arx & Müller 1975) or, in a more sophisticated system based on additional morphoanatomic characters (Barr 1979), in Phaeosphaeriaceae. Asci of *Didymocyrtis* species with their narrowly cylindrical shape and the +/– monostichously arranged ascospores recall those of *Didymosphaeria* species (compare Scheinpflug 1958, Aptroot 1995a), but the peridial wall of *Didymosphaeria* is two-layered, composed of strongly interwoven hyphae, seen as textura intricata in longitudinal section, interascal filaments are trabeculate pseudoparaphyses and ascospores are thinly distoseptate resulting in rounded ascospore cell lumina (Aptroot 1995a). Using the key for *Didymosphaeria* and similar ascomycete genera, provided by Aptroot (1995b), *Didymocyrtis* species would key under *Aaosphaeria* (generic type: *A. arxii* (Aa) Aptroot), but the characterizing features for this so far monotypic genus include not-anastomosing interascal filaments and the formation of a *Microsphaeropsis* anamorph (Aptroot 1995b, Aa 1989). Generic synonyms of *Didymosphaeria* are all based on heterotypic synonyms of *Didymosphaeria futilis* (*Didymosphaerella* Cooke, *Didymascina* Höhn., *Massariellops* Curzi) or other species (*Cryptodidymosphaeria* (Rehm) Höhn., *Haplovalsaria* Höhn.) recognized as belonging to *Didymosphaeria* by Aptroot (1995a). Of the accepted species only one, *D. conoidea* Niessl, the type species of *Cryptodidymosphaeria*, is fungicolous. According to our comparative studies, *Didymosphaeria conoidea* does not belong to *Didymocyrtis*.

4. Frequently *Phoma* anamorphs are found on the same host as the ascomata of *Didymocyrtis* species. Several lichenicolous species previously classified in *Phoma* have meanwhile been transferred to other

genera, due to peculiar phenotypic characters, e.g. *Vouauxiomyces*, *Pseudoseptoria*, and *Bachmanniomyces*. However, among the lichenicolous fungi there are also *Phoma*-like coelomycetes exhibiting the *Phoma* character set (e.g. Hawksworth 1981, Diederich et al. 2007). We could demonstrate (Ertz et al. 2015) that several lichenicolous *Phoma*-like fungi belong to the *Didymocyrtis*-clade and evidently constitute anamorphic states of this genus.

5. *Phoma* anamorphs are known for several pleosporalean teleomorphs (Sivanesan 1984). The genus *Phoma* is subdivided into nine sections with teleomorphs in the genera *Didymella*, *Leptosphaeria*, *Mycosphaerella* and *Pleospora* (Boerema 1997). By molecular methods Gruyter et al. (2009) could confirm the polyphyletic character of *Phoma* in the Pleosporineae (see also Zhang et al. 2009). The generic type, *Phoma herbarum*, grouped in the Didymellaceae, and therefore, *Phoma* species in the Didymellaceae are considered as *Phoma* s.str. (see also Hyde et al. 2013). Further molecular data provided by Aveskamp et al. (2010) have confirmed that *Phoma* species turn up not only in the Didymellaceae, but also in the related clades Leptosphaeriaceae, Phaeosphaeriaceae and Pleosporaceae. A *Phoma*-like anamorph is also reported for *Didymosphaeria* (e.g. Aptroot 1995a). For some lichenicolous *Phoma*-like fungi Lawrey et al. (2012) have shown that they form a clade in Phaeosphaeriaceae. For the more or less identical group of species Trakunyingcharoen et al. (2014) described the new genus *Diederichomyces* in the or close to the Phaeosphaeriaceae-clade. One of the species treated here, *Phoma caloplacae*, the anamorph of *Didymocyrtis consimilis*, has been transferred to that genus too. Therefore it was not surprising that *Diederichomyces* turned out to constitute a younger synonym of *Didymocyrtis* (Ertz et al. 2015).

6. *Phoma*-like anamorphs with divergent characters were also reported for some *Polycoccum* species, e.g. *Polycoccum rubellianae* (Atienza et al. 2003), a species which according to the published characters and figures as well as own observations does not belong to *Didymocyrtis*. But in this case, according to the given size of the conidia (3–4.5 × 1–1.5 µm), they most likely represent microconidia (spermatia).

7. All known species of *Didymocyrtis* are lichenicolous.

The species

Didymocyrtis bryonthae (Arnold) Hafellner in Ertz et al., Fungal Diversity 74: 66 (2015).

≡ *Endococcus bryonthae* Arnold, Flora (Regensburg) 57: 141 ([21. März] 1874). – *Didymosphaeria bryonthae* (Arnold) G.Winter, Rabenh. Krypt.-Fl., 2. Aufl., 1(2): 430 (1885). – *Microthelia bryonthae* (Arnold) Kuntze, Revisio generum plantarum 3: 498 (1898). – *Mycoporum bryonthae* (Arnold) Jatta, Syll. Lich.: 494 (1900). – *Tichothecium bryonthae* (Arnold) Jatta, Fl. Ital. Crypt. Lich.: 841 (1911). – *Sphaeria bryonthae* (Arnold) H.Olivier, Bull. Int. Acad. Géogr. Bot. 17: 170 (1907). – *Polycoccum bryonthae* (Arnold) Vězda, Ceská Mycol. 23: 109 (1969).

Typus: [Austria, Nordtirol, Serlos-Gruppe], Kalkboden links ober der Ochsenalm, Matreier Grube, Waldrast in Tirol, 6000´ [6000 Wiener Fuß = ca. 1900 m], VIII. 1873, leg. F. Arnold (M, holotype)!

Host of type: *Lecanora epibryon* (ap.) (as *Lecanora subfusca* var. *bryontha*)

= *Phoma denigricans* Hafellner, Herzogia 10: 18 (1994).

Typus: 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 11989 (GZU – holotype)!

Host of type: *Lecanora epibryon* (ap.)

Full descriptions: teleomorph: Ertz et al. 2015: 66–67, Hawksworth & Diederich 1988: 297, Arnold 1874a: 141; anamorph: Ertz et al. 2015: 67, Hafellner 1994: 18.

Icon.: Arnold 1874a: Tab. II fig. 15 (drawings of ascus, ascospores); Hawksworth & Diederich 1988: 296, fig. 1B (drawing of ascospores); Hafellner 1994: 20, Fig. 8 (drawings of conidioma in longitudinal section, conidiomatal wall, conidiogenous cells, conidia).

Key characters for identification: Ascospores ± uniseriate, pale brown, 1-septate, some (less than 5 %) with an additional septum in the upper cell, (10–)11.5–14(–16)×4–5 µm, often slightly constricted at the septum; septum with externally protruding torus; spore wall with distinct verruculose sculpture. Conidia ellipsoid to somewhat tapering towards the lower end to oblong, many biguttulate, (6–)7–8×3–4 µm, length-width ratio 2–2.3 (Ertz et al. 2015).

Notes: 1. Arnold, Lich. exs. 615 (sub *Endococcus bryonthae*), given as type collection by various authors (e.g. Aptroot 1995a), is in fact a “topotype”, collected on 4. IX. 1874, therefore after the appearance of the protologue (21 March 1874).

2. The teleomorph of *Didymocyrtis bryonthae* can be separated from the phenotypically similar teleomorph of *Didymocyrtis consimilis* by its distinctly verruculose ascospores measuring 11.5–14×4–5 µm.

3. The anamorph of *Didymocyrtis bryonthae* (*Phoma denigricans*) can be separated from the phenotypically similar anamorph of *Didymocyrtis consimilis* (*Phoma caloplacae*) by its conidia of ellipsoid to oblong shape measuring (6–)7–8×3–4 µm, length/width ratio 2–2.3.

4. The genetic identity of the teleomorph and the anamorph still needs confirmation by sequence data.

Hosts: Teleomorph and anamorph in the hymenia of *Lecanora epibryon* (1, T). – *Didymocyrtis bryonthae* is a specific invader of species belonging to the *Lecanora subfusca* group. Different from *Didymocyrtis consimilis*, it is so far unknown from bark inhabiting *Lecanora* species common in lowlands. *Lecanora epibryon*, however, is occasionally also found on bark of dwarf shrubs where its apothecia are sometimes infested with *Didymocyrtis bryonthae* (e.g. Arnold, Lich. exs. 615). Records of *Polycoccum bryonthae* on *Caloplaca* species of the *C*. *cerina*-group refer to *Didymocyrtis consimilis* (see above). Those on other hosts are doubtful and may belong to undescribed species. For the species reported several times

on *Pertusaria bryontha* see below! Further host lichens mentioned include *Rhizocarpon umbilicatum* (sub *R. calcarium*) (Lettau 1958) and *Bacidia carneoglauca* (Priemetzhofer 2005), and *Pertusaria lactea* (Roux et al. 2006).

Known distribution and previous records of the teleomorph: As *D. bryonthae* is understood here in a narrow sense, only records on *Lecanora epibryon* can be regarded as certain and the outlined distribution is based solely on such reliable records. So far *Didymocyrthis bryonthae* has been recorded only in the Holarctic region. Most data are from Europe where the species has been recorded from Austria (e.g. Arnold 1874a, 1875: 482, Ertz et al. 2015: 67, Hafellner 1996a: 78, Hafellner & Obermayer 2007: 46, Hafellner & Wittmann 1996: 19), Italy (Ertz et al. 2015: 67), Svalbard (Zhurbenko 2009b: 148, Zhurbenko & Brackel 2013: 344), Sweden (Santesson 1993) and Switzerland (Keissler 1930: 477, note on an admixture on Schleicher, Plantae Crypt. Helvet. 62). In Asia it has been collected several times in Russia [Siberia] (Ertz et al. 2015: 67, Zhurbenko 1996: 226, 2008: 18, 2009b: 148, Zhurbenko & Hafellner 1999: 76) and Mongolia (Ertz et al. 2015: 67). In North America there are records from the U.S.A. [Alaska] (Zhurbenko 2009b: 148) and Greenland (Ertz et al. 2015: 67).

Known distribution and previous records of the anamorph: Again, the anamorph has been recorded so far only in the Holarctic region. Most records are from Europe where the species has been published for the fungus flora of Austria (Ertz et al. 2015: 67, Hafellner 1994: 18, 2008: 96, Hafellner & Obermayer 2007: 46, Hafellner & Türk 1995: 621, Hafellner & Wittmann 1996: 10, 19, Hafellner et al. 2004: 64, 2005b: 129), Germany (Ertz et al. 2015: 67, Triebel & Scholz 2001: 223), Italy (Hafellner 1994: 18), Poland (Kukwa & Flakus 2009: 204), Svalbard (Zhurbenko 2009b: 147, Zhurbenko & Brackel 2013: 344), and Ukraine (Kondratyuk et al. 1998: 120, host not mentioned, in need of confirmation). Zhurbenko (2009b: 147) published specimens originating from Russia [Siberia] and from Canada, so far the only records for Asia and North America. For Greenland we confirmed the presence of the species with a further collection of the anamorph (Ertz et al. 2015: 67).

Exsiccata examined: Teleomorph: Arnold, Lich. exs. 615 sub *Endococcus bryonthae* (M, 2 specimens), sec. Aptroot (1995a: 59) further duplicates in H, W, Z and sec. Hawksworth & Diederich (1988) also in K. Material originating from the type locality. – Hafellner, Lichenicolous Biota no. adhuc ined. (BR, CANB, GZU, NY, UPS). – Anamorph: Santesson, Fungi Lichenicoli exs. 363 (GZU, M).

Further specimens seen:

Teleomorph: **Europe**: **Austria**: Niederösterreich, Rax Alpe, (1), VIII. 1870, leg. Glowacki (M). – Salzburg, Nationalpark Hohe Tauern, Glockner Gruppe, NW-Grat des Großen Margrötzen 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, (1), 5. VIII. 1996, leg. J. Hafellner 38118 & H. Wittmann (GZU). – Steiermark: Nordalpen (Nördliche Kalkalpen), Mürzsteger Alpen, Veitsch Alpe N von Kindberg, am S-Rand des Plateaus N über dem Breitriegel, 47°38’50’’N / 15°25’20’’E, ca. 1840 m, GF 8358/4, kleine Ausbisse aus Triaskalk in Caricetum firmae, auf Pflanzenresten, (1), 30. IX. 2006, leg. J. Hafellner no. 76494 & L. Muggia (GZU). – Steiermark, Niedere Tauern, Wölzer Tauern, Berge ca. 8 km WNW von Pusterwald, Kleinhansl, E-Rücken WSW über der

Wildalmhütte, 47°19’25’’N / 14°16’30’’E, ca. 2100 m, GF 8651/4, niedere Kalkschieferausbisse am Grat, auf Moosen und Pflanzenresten, (1), 25. VIII. 2005, leg. J. Hafellner 76495 (GZU) = Hafellner, Lichenicolous Biota no. adhuc ined. – Steiermark, 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, (1), 19. VIII. 1993, leg. J. Hafellner 31030 & A. Wilfling (GZU). – Steiermark, Steirisches Randgebirge, Stubalpe W von Köflach, Brandkogel ca. 3 km S vom Pass Gaberl, am waldfreien Rücken zwischen dem Alten Almhaus und dem Gipfel, 47°05’N / 14°56’E, ca. 1620 m, GF 8955/2, subalpine Weide über Gneis und Marmorbändern, auf Moosen und Pflanzenresten, (1), 19. V. 1997, leg. J. Miadlikowska & J. Hafellner 42271 (GZU). – Steiermark, Steirisches Randgebirge, Grazer Bergland, Plankogel S über Gasen, ca. 10 km W von Birkfeld, kurz N unterhalb vom Gipfel, 47°21’20’’N / 15°33’30’’E, ca. 1500 m, GF 8659/1, kleine Felsen aus paläozoischem Kalkschiefer an der Waldgrenze, auf Moosen an Felsabsätzen, (1), 11. XII. 2004, leg. J. Hafellner 63924 (GZU). – Tirol: auf Kalkboden ober der Matreier Grube, Waldrast in Tirol, 6000´ [6000 Wiener Fuß = ca. 1900 m], (1), 4. IX. 1874, leg. F. Arnold = Arnold, Lich. exs. 615 (M, 2 specimens).

Anamorph: **Europe**: **Austria**: Kärnten: Nationalpark Hohe Tauern, Glockner-Gruppe, NW-Grat des Großen Margrötzen Kopfs W ober dem Hochtor, knapp SW unter dem Grat, [47°05’10’’N / 12°50’05’’E], ca. 2620 m, GF 8943/1, Granatglimmerschiefer / alpine Matten, über Moosen und Pflanzenresten, (1), 30. VIII. 1996, leg. J. Hafellner 39855 (GZU). – Kärnten: Nationalpark Hohe Tauern, Ankogel-Gruppe, NW von Mallnitz, Hänge E der Hagener Hütte gegen den Greilkopf, [47°01’30’’N / 13°05’45’’E], 2350–2450 m, GF 8944/4, auf Pflanzenresten, (1), 28. VII. 1989, leg. R. Türk & J. Hafellner 32031 (herb. Hafellner). – Kärnten: Gailtaler Alpen, N-seitige Abbrüche der Jaukenhöhe [am W-Rücken unter dem Jaukenstöckl], [46°42’05’’N / 13°03’00’’E], ca. 2000 m, GF 9244/3, (1), 16. VII. 1978, leg. J. Hafellner 3885 (herb. Hafellner). – 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 Kalkschiefer, auf Moosen und Pflanzenresten, (1), 20. VII. 1996, leg. J. Hafellner 38273 & H. Wittmann (GZU). – Ibid., (1), 27. VIII. 1996, leg. J. Hafellner 53924 (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, Granatglimmerschiefer / alpine Matten, über Moosen und Pflanzenresten, (1), 30. VIII. 1996, leg. J. Hafellner 40106 = Santesson, Fungi Lichenicola exs. 363 (GZU). –Steiermark: Niedere Tauern, Schladminger Tauern, Znachsattel S ober der Giglachseehütte S von Schladming, NE-Hänge unmittelbar W ober dem Sattel, 47°16’30’’N / 13°38’20’’E, ca. 2060 m, GF 8747/2, Dryas-reiche Rasen über Kalk, auf Moosen und Pflanzenresten, (1), 27. VIII. 2001, leg. J. Hafellner no. 76506 (GZU). –Steiermark, Niedere Tauern, Schladminger Tauern, Sölktal, W ober St. Nikolai im Sölktal, am Grat SSE der Seekarlspitze, S vom Großen Knallstein, [47°18’15’’N / 13°58’35’’E], ca. 2430 m, GF 8649/4, Marmorband, E-exponiert, auf Moosen und Pflanzenresten, (1), 8. IX. 1993, leg. J. Hafellner 31230 & A. Wilfling (herb. Hafellner). – Steiermark, 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, auf Moosen und Pflanzenresten, (1), 26. VII. 1985, leg. J. Hafellner 14077 (herb. Hafellner). – Steiermark: Niedere Tauern, Wölzer Tauern, Berge NW von Oberwölz, Rettlkirchspitze SW über der Neunkirchner Hütte, im Bereich der kleinen Einsattelung zwischen Gipfel und E Vorgipfel, 47°15’40’’N / 14°07’50’’E, ca. 2430 m, GF 8750/2, niedere Marmorausbisse in alpiner Vegetation, auf Moosen und Pflanzenresten, (1), 27. IX. 2009, leg. J. Hafellner no. 76501 & A. Hafellner (GZU). – Steiermark, Niedere Tauern, Wölzer Tauern, Hohenwart-Massiv W von Pusterwald, am Steig zum Pölseckjoch, E unter dem Gipfel, [47°19’45’’N / 14°14’30’’E], ca. 2200 m, GF 8651/3, NE-exponierte intermediäre Marmorschrofen, auf Erde und Pflanzenresten, (1), 18. VIII. 1993, leg. A. Wilfling 1631, J. Hafellner & M. Möslinger (GZU). – Steiermark, Niedere Tauern, Wölzer Tauern, Berge ca. 6 km NW von Pusterwald, Bergrücken zwischen Gruber-Hirnkogel und Jauriskampel, NE ober der

Wildalmhütte, 47°20’00’’N / 14°18’10’’E, ca. 2020 m, GF 8651/4, niedere Marmorschrofen knapp unter dem Grat, auf Moosen und Pflanzenresten, (1), 26. VII. 2003, leg. J. Hafellner no. 75193 (GZU). – Steiermark, Niedere Tauern, Wölzer Tauern, Bergkette N von Lachtal ca. 9,5 km NE von Oberwölz, Kleiner Zinken, etwas SW unter dem Gipfel, 47°16’35’’N / 14°21’20’’E, ca. 2120 m, GF 8752/1, W-E streichende Marmorrippe, S-exp. auf Moosen und Pflanzenresten, (1), 1. IX. 2009, leg. J. Hafellner no. 76505 (GZU). – Steiermark, Gurktaler Alpen, N unter der Stang Scharte (zwischen Stang Nock und Gregerl Nock), 46°55’55’’N / 13°48’10’’E, ca. 2020 m, GF 9048/4, subalpine Zwergstrauchheiden mit einzelnen großen Felsblöcken auf Pflanzenresten, (1), 15. VIII. 1989, leg. J. Hafellner 64051 (herb. Hafellner). – Steiermark, Steirisches Randgebirge, Stubalpe, 12 km WNW of Köflach, 200 m S of Altes Almhaus, Wölkerkogel, 47°04’50’’N / 14°55’30’’E, 1650–1700 m, GF 8955/2, pasture ground with marble outcrops, on plant debris and soil, (1), 10. X. 1997, leg. W. Obermayer 6550 (GZU). – Steiermark, Steirisches Randgebirge, Koralpe, Großes Kar N vom Großen Speikkogel, ober dem markierten Weg zum Schäferkreuz, [46°47’40’’N / 14°58’40’’E], ca. 1950 m, GF 9255/2, W-exponierte Abbrüche von Marmorschrofen, auf Moosen und Pflanzenresten, (!), 19. IX. 1993, leg. A. Wilfling 1803 (GZU). – **Germany**: Bayern [Bavaria], Alpspitze, (1), 1846, leg. A. Krempelhuber (M). – Bayern, Watzmann, 5600´, (1), 1855, leg. A. Krempelhuber (M).

Didymocyrtis cladoniicola (Diederich, Kocourk. & Etayo) Ertz & Diederich in Ertz et al., Fungal Diversity 74: 67 (2015).

≡ *Phoma cladoniicola* Diederich, Kocourk. & Etayo, Lichenologist 39: 157 (2007). – *Diederichomyces cladoniicola* (Diederich, Kocourk. & Etayo) Crous & Trakunyingcharoen in Trakunyingcharoen et al., IMA Fungus 5: 401 (2014).

Typus: USA, Minnesota, Cottonwood County, 2 miles W of US 71, 14.5 miles N of Windom, 44°06’40’’N, 95°04’30’’W, 400 m, seasonally dry, flat, Sioux quartzite outcrop on N side of road, 28. IX. 1991, W. R. Buck 20859A (NY – holotypus!; hb. Diederich – isotypus!) fide Ertz et al. (2015) n.v.

Host of type: *Cladonia pyxidata* (th.)

Full descriptions: anamorph: Diederich et al. 2007: 157, Lawrey et al. 2012: 204–206, Ertz et al. 2015: 67–68.

Icon.: Diederich et al. 2007: 158, Fig. 3 (photographs of infested squamules of *Cladonia foliacea*, conidioma in longitudinal section, conidia); Lawrey et al. 2012: 205, Fig. 4i–k (photographs of culture, conidia); Trakunyingcharoen et al. 2014: 402, Fig. 6 (photographs of culture with conidiomata, conidioma in longitudinal section, conidiogenous cells, conidia).

Key characters for identification: Conidia ellipsoid, biguttulate, with a small guttule near each apex, (3.8–)4.7–5.9(–7.3)×(2.0–)2.4–3.0(–3.5) µm, length-width ratio (1.4–)1.7–2.2(–2.8) (Ertz et al. 2015).

Notes: 1. The species is so far known only by its anamorph.

2. The two *Didymocyrtis* species known to infest *Cladonia* species can be distinguished by the size and shape of the conidia. Those of D. *foliaceiphila* are longer than the conidia of *D*. *cladoniicola* and, as the width of both is very similar, they appear comparably slim.

3. *D*. *cladoniicola* is a rather aggressive lichenicolous fungus causing distinct necrotic areas on the host thalli and it may eventually kill them completely.

Hosts: *Cladonia foliacea* (th.) (1), *C*. *convoluta* (th.) (2), *C*. *uncialis* (th.) (3), *C*. *pocillum* (th.) (4); further reported hosts: *Cladonia cervicornis*, *C*. *fimbriata*, *C*. *furcata*, *C*. *phyllophora*, *C*. *pyxidata*, *C*. *ramulosa*, *C*. *rangiformis*, *C*. *symphycarpia*, *Flavoparmelia caperata*, *Parmelina tiliacea*, *Ramalina pollinaria*, *R*. *polymorpha*, and *Squamarina cartilaginea* (Ertz et al. 2015). *Cladonia uncialis* is an addition to the host spectrum.

Known distribution and previous records: The known distribution has been summarized by Ertz et al. (2015). The species was so far reported from Europe (Belgium, Czech Republic, France incl. Corsica, Germany, Spain, Ukraine), Africa (Canary Islands), and North America (USA: Minnesota; Greenland). A record for Russia has been published by Urbanavichus & Urbanavichene (2011: 122). It is herewith reported for the first time for the European countries Albania, Austria, Romania and Sweden, as well as for Asia (Armenia).

Exsiccata examined: -.

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, (4), 23. VI. 2000, leg. L. Kashta, herb. Hafellner no. 57601 (GZU). – **Austria:** Burgenland, Südburgenland, Günser Gebirge, Galgenberg W von Rechnitz, sanfte S-exponierte Abhänge, 47°17’50’’N / 16°25’10’’E, ca. 440 m, GF 8764/2, Trockenrasen über Kalkphyllit, auf Erdblößen, (1), 26. IV. 1991, leg. J. Hafellner no. 41874 & W. Maurer (GZU). – **France:** Dept. Var, Massif des Maures, zwischen Hyères und Pierrefeu-du-Var, 2 km S von Pierrefeu-du-Var, c. 60 m alt., aufgelockertes Quercetum suberis, (2), 13. V. 1980, leg. J. Hafellner no. 8565 (herb. Hafellner). – **Italy**: Friuli-Venezia Giulia, Trieste prov., E of Trieste, 0,5 km NE of Basovizza, 45°38,81'N / 13°52,42'E, c. 380 m alt., dry meadow, on soil, (2), 17. III. 2001, leg. W. Starmühler (GZU). – **Romania**: Dobrogea Prov., Tulcea distr., Caraorman Island, outside Caraorman forest, 45°03'N / 29°24'E, c. 20 m alt., on old sand dunes, (1), 5. X. 1992, leg. R. Moberg no. 10136a bis (separated from Lich. Sel. Exs. Upsal. 119) (GZU). – **Sweden:** Bohuslän: Uddevalla commune, Skredsvik par., ca. 1 km NE of Cederslund along road Skredsvik--Munkedal, alt. ca. 80 m; open Pinus forest, on forest floor, (3), 27. VIII. 1992, leg. J. Hafellner no. 30412 (herb. Hafellner). – **ASIA: Armenia**: Lori prov., road from Akhtala to Georgia, NW of intersection of road to Noyemberyan, 41°12’58’’N / 44°53’47’’E, c. 500 m alt., dry slopes E of the road, on soil among bryophytes, (2), 25. VI. 2008, leg. K. Kugler & E. Vitek no. 08-L06-25a (GZU).

Didymocyrtis consimilis Vain., Acta Soc. Fauna Flora Fenn. 49(2): 221, 263 (1921).

Typus: [Finland], „in Selkäsaari in par. Simo in Ostrobotnia bor., on bark of *Sorbus*", leg. V. Räsänen (TUR-VAIN 32734), holotype!

Host of type: *Caloplaca cerina* (ap.) (as *Placodium gilvum* var. *cyanolepra*)

= *Phoma caloplacae* D.Hawksw., Bull. Brit. Mus. (Nat. Hist.), Bot. ser. 9(1): 50 (1981). – *Diederichomyces caloplacae* (D.Hawksw.) Crous & Trakunying-charoen in Trakunyingcharoen et al., IMA Fungus 5(2): 401 (2014).

Typus: [Russia], Guv. Jenisejsk, Stolba, 60°20'N, 1. VII. 1876, leg. M. Brenner 1027 p.p. (UPS – holotypus) n.v. Locality data from protologue.

Host of type: *Caloplaca cerina* (ap.)

Full descriptions: teleomorph: Vainio 1921: 221–222, Ertz et al. 2015: 68; anamorph: Hawksworth 1981: 50–51, Lawrey et al. 2012: 202–204, Ertz et al. 2015: 68.

Icon.: Hawksworth 1981: 50, Fig. 24 (drawings of conidioma, conidiomatal wall, conidiogenous cells, conidia); Ihlen & Wedin 2008: 237, Fig. 38 (photograph of infested *Caloplaca cerina* apothecium); Halıcı et al. 2014: 165, Fig. 2 (photographs of infested *Caloplaca stillicidiorum* apothecium, conidioma in longitudinal section); Lawrey et al. 2012: 205, Fig. 4a–h (photographs of habit, conidioma in longitudinal section, culture, conidia); Trakunyingcharoen et al. 2014: 402, Fig. 5 (photographs of culture with conidia, conidioma in longitudinal section, conidiogenous cells, conidia); Ertz et al. 2015: 69, Fig. 4 (photographs of habit, ascoma and conidioma in longitudinal section, ascoma, conidia), Fig. 9 a–b (photographs of culture, conidia).

Key characters for identification: Ascospores ± uniseriate or half-overlapping, pale brown, 1-septate, some (less than 5 %) with an additional septum in the upper half, 12–15×(4.5–)5–6(–6.5) µm, hardly constricted at the septum, externally protruding torus at the septum indistinct, verruculose sculpture hardly visible in light microscopy. Conidia 1–2-guttulate, rather variable in shape and size, broadly ellipsoid, 4.5–6.5×2.5–4.5 µm, to subglobose, (4–)5–6(–7) µm diam., length-width ratio <1.5 (Ertz et al. 2015).

Notes: 1. The conspecificity of the teleomorph *Didymocyrtis consimilis* and the anamorph *Phoma caloplacae* has been proven by DNA sequence data (Ertz et al. 2015).

2. The anamorph of *Didymocyrtis consimilis* (*Phoma caloplacae)* can be separated from the phenotypically similar supposed anamorph of *Didymocyrtis bryonthae* (*Phoma denigricans*) by its conidia of subglobose shape, measuring (4–)5–6(–7) µm in diam..

3. A dozen further phaeodidymosporous pyrenomycetes have been described with members of Teloschistaceae as hosts (Table 3), of which seven species are included in *Polycoccum*, two in *Sphaerellothecium*, and three have been recognized as heterotypic synonyms of other species. Of those included in *Polycoccum*, only P. *rugulosarium* would have priority over *Didymocyrtis consimilis*, in case that they would be recognized as being conspecific. However, we regard both as clearly different species belonging to different genera.

4. It is worth mentioning that a further endohymenial *Phoma* has been recently described on *Caloplaca*, ***Phoma recepii*** Halıcı & Candan (Halıcı et al., Mycotaxon 129: 164, 2014). Host of the type is *Caloplaca monacensis.* We have not seen that species, but judging from the illustrations presented with the protologue (Halıcı et al. 2014: 165 Fig. 1, photograph of infested *Caloplaca monacensis* apothecium) and conidial size (2.5−3−3.5×1 µm), it is obviously not an anamorph of a *Didymocyrtis*.

The possibility that *Phoma recepii* represents an anamorphic (micro-conidial) state of *Stigmidium cerinae* would be worth testing by molecular data.

Hosts: Ascomata in the hymenia of *Caloplaca cerina* (1, T), *Caloplaca cerina* var. *muscorum* (2), *Caloplaca stillicidiorum* (3), *Caloplaca tiroliensis* (4). – *Didymocyrtis consimilis* s.str. is a specific invader of species belonging to the *Caloplaca cerina* group or related tribes of *Caloplaca* (e.g. *C. tiroliensis*). In habitats colonized by several *Caloplaca* species, such as wind-swept meadows along ridges of limestone mountains, only those are occasionally infested. Species belonging to other *Caloplaca* sections (e. g. *Caloplaca ammiospila*, *C. saxifragarum*, *C. sinapisperma, C. tetraspora*) inhabiting the same niche are not known to have ever been parasitized by *Didymocyrtis consimilis*. This indicates a narrow host spectrum and is also a good reason to treat the species upon *Lecanora*, *Didymocyrtis bryonthae*, as being specifically distinct. Of *Caloplaca cerina* both varieties are occasionally infected, the bark-inhabiting strain (v. *cerina*) at lower altitudes and the debris-inhabiting strain (v. *muscorum*) commonly found in high altitudes or latitudes. The conidiomata also develop in the hymenia of *Caloplaca cerina* (1, T), *Caloplaca cerina* var. *muscorum* (2), *Caloplaca stillicidiorum* (3), and *Caloplaca tiroliensis* (4). Records on other hosts (*Bryonora castanea*, *Lecanora geophila*) are doubtful and may belong to undescribed species (Zhurbenko 2009a, b).

Known distribution and previous records of the teleomorph: So far, *D. consimilis* (mostly under the name *Polycoccum bryonthae*, on *Caloplaca* species) has been recorded only in the Holarctic region. Most records are from Europe. There, the species has been recorded from Austria (Hawksworth & Diederich 1988: 297, Komposch & Breuss 2013: 502, Ertz et al. 2015: 68 ff.), Finland (Vainio 1921: 221, Ertz et al. 2015: 68 ff.), France (Roux et al. 2014, Ertz et al. 2015: 68 ff.), Italy (Brackel 2015: 235, Ertz et al. 2015: 68 ff.), Poland (Kukwa & Flakus 2009: 204), and Slovakia (Hawksworth & Diederich 1988: 297). Outside Europe it has only been reported from Greenland (Alstrup & Hawksworth 1990: 54).

Known distribution and previous records of the anamorph: Records of the anamorph of *Didymocyrtis consimilis* have previously been published under the name *Phoma caloplacae*. Like the teleomorph, it has been recorded only in the Holarctic region, too. Most records are from Europe. There, the species has been published for the fungus flora of Austria (Berger & Türk 1993: 187, Hafellner 1994: 19, 2000: 101, Hafellner & Obermayer 2007: 46, Hafellner & Türk 1995: 621, Hafellner & Wittmann 1996: 10, 12, 19, Hafellner et al. 2004: 64, 2005a: 93, 2008: 183, Wilfling & Komposch 2002: 255, Wittmann & Türk 1990: 96, Ertz et al. 2015: 68 ff.), Germany (Ertz et al. 2015: 68 ff.), Italy (Ertz et al. 2015: 68 ff.), Norway (Santesson et al. 2004: 246), Slovakia (Ertz et al. 2015: 68 ff.), Slovenia (Ertz et al. 2015: 68 ff.), Spain (Ertz et al. 2015: 68 ff.), and Sweden (Magnusson 1952: 247 sub *Phoma physciicola*, Ertz et al. 2015: 68 ff.). In Asia it has been reported from Russia [Siberia] (Hawksworth 1981: 50, Zhurbenko 2009a: 105), Iran (Seaward et al. 2008: 495) and Israel (Kondratyuk et al. 2005: 105). North American records we traced so far

only from Canada, published by Lawrey et al. (2012: 197) and Freebury (2014: 115).

Exsiccata examined: Hafellner, Lichenicolous Biota no. adhuc ined. (BR, CANB, GZU, NY, PRM, UPS).

Further specimens seen:

Teleomorph: **EUROPE**: **Austria**: 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, (3), 5. VI. 2010, leg. J. Hafellner 75686 (GZU). – Ibid., (4), leg. Hafellner 75687 (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, (4), 10. VIII. 2010, leg. J. Hafellner 76035 & L. Muggia (GZU). – Steiermark, 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 firmae-Fragmente und Kalkschrofen, NW-seitig auf Moosen und Pflanzenresten, (4), 3. VII. 2005, leg. J. Hafellner 69590 (GZU) = Hafellner, Lichenicolous Biota no. adhuc ined. – Steiermark, Nordalpen (Nördliche Kalkalpen), Mürzsteger Alpen, Rauschkogel NE von Turnau, am SW-Rücken knapp unter dem Gipfel, 47°36’40’’N / 15°22’15’’E, ca. 1660 m, GF 8358/3, niedere Kalkausbisse knapp über der Waldgrenze, auf Moosen und Pflanzenresten, (3), 19. VIII. 2005, leg. J. Hafellner 83638 (GZU). – Steiermark, Niedere Tauern, Schladminger Tauern, Kleinsölktal, NW vom Bauleiteck, E oberhalb der Striegleralm, W unter der Hasenohrenscharte, [47°16'25"N / 13°58'10"E], ca. 2250 m, schattig-feuchte, NNE-exponierte Marmorwand, auf Moosen, (3), 21. IX. 1993, leg. A. Wilfling 268 & M. Möslinger (GZU). – Steiermark, Niedere Tauern, Wölzer Tauern, Hochstein, 5 km SE von Donnersbach, ca. 2 km NNW der Planneralm, Marmorband W unter dem Grat, [47°25'55"N / 14°11'15"E], 2100 m, GF 8551/3; NNW-exponierte Marmorabbrüche, auf Moosen und Pflanzenresten, (4), 13. IX. 1993, leg. A. Wilfling 409 & M. Möslinger (GZU). – Steiermark, Niedere Tauern, Wölzer Tauern, Gumpeneck SE von Gröbming, Gipfelpyramide, NW-seitig, 47°23'50"N / 14°00'50"E, ca. 2180 m, GF 8650/1, niedere Schrofen aus Marmor, auf Moosen und Pflanzenresten, (3, 4), 10. VI. 1993, leg. J. Hafellner & A. Wilfling 1848 (GZU). – Steiermark, Niedere Tauern, Wölzer Tauern, Berge ca. 6 km NW von Pusterwald, Bergrücken zwischen Gruber-Hirnkogel und Jauriskampel, NE ober der Wildalmhütte, 47°20’00’’N / 14°18’10’’E, ca. 2020 m, GF 8651/4, niedere Marmorschrofen knapp unter dem Grat, auf Moosen und Pflanzenresten, (4), 26. VII. 2003, leg. J. Hafellner 75192 (GZU). – Steiermark, Niedere Tauern, Wölzer Tauern, Berge ca. 8 km WNW von Pusterwald, E-Hänge des Kleinhansl, am Steig vom der Wildalmhütte zum Kleinhansl, 47°19’40’’N / 14°16’40’’E, ca. 2000 m, GF 8651/4, niedere Ausbisse und kleine Schrofen aus Marmor, auf Moosen und Pflanzenresten, (3), 25. VIII. 2005, leg. J. Hafellner 75190 (GZU). – Steiermark, Niedere Tauern, Wölzer Tauern, Zinkenkogel N von Bretstein, W-Grat kurz unter dem W Seitengipfel direkt am markierten Weg, 47°25’05’’N / 14°21’45’’E, ca. 2000 m, GF 8552/3; Marmorband, das direkt über den Rücken läuft, auf Erde und Erdmoosen, (4), 19. VIII. 1993, leg. A. Wilfling 2041, J. Hafellner & M. Möslinger (GZU). – Steiermark, [Gurktaler Alpen], am Ufer des Laßnitzbaches an der Straße von Murau nach St. Lambrecht, kurz N der Einmündung des Auenbaches, [47°04’35’’N / 14°12’15’’E], ca. 920 m, GF 8951/1, Ufergehölzstreifen, an Alnus incana, (1), 24. X. 1989, leg. J. Hafellner 22550 & E. Schreiner (herb. Hafellner). – Steiermark, Steirisches Randgebirge, Fischbacher Alpen, im Feistritztal ca. 2,5 km S von Birkfeld, am orographisch rechten Ufer der Feistritz kurz ober der Einmündung des Gasenbaches, 47°19’55’’N / 15°41’45’’E, ca. 530 m, GF 8660/3, Ufergehölzstreifen, auf tiefhängenden Zweigen von *Fraxinus excelsior*, (1), 25. XII. 2000, leg. J. Hafellner 53800 (herb. Hafellner). – Steiermark, Steirisches Randgebirge, Grazer Bergland, Plankogel S über Gasen, ca. 10 km W von Birkfeld, kurz N unterhalb vom Gipfel, 47°21’20’’N / 15°33’30’’E, ca. 1500 m,

GF 8659/1, kleine Felsen aus paläozoischem Kalkschiefer an der Waldgrenze, auf Moosen und Pflanzenresten, (3), 11. XII. 2004, leg. J. Hafellner 63905 (herb. Hafellner).

Anamorph: **EUROPE**: **Austria**: Kärnten (Carinthia), Nationalpark Hohe Tauern, Glockner-Gruppe, NW-Grat des Großen Margrötzen Kopfs W ober dem Hochtor, knapp SW unter dem Grat, [47°05'10''N / 12°50'05''E], ca. 2620 m, GF 8943/1, Granatglimmerschiefer / alpine Matten, über Moosen und Pflanzenresten, (2), 30. VIII. 1996, leg. J. Hafellner 40076 (GZU). – Kärnten, Nationalpark Hohe Tauern, Glockner-Gruppe, Sattelalpe W von Heiligenblut, ca. 1 km SE der Bricciuskapelle, [47°03'01''N / 12°48'10''E], ca. 1600 m, GF 8942/2, Ca-haltige Blöcke, über Pflanzenresten, (2), 22. XI. 1987, leg. J. Hafellner 23706 & M. Walther (herb. Hafellner). – Kärnten, Nationalpark Hohe Tauern, Goldberg-Gruppe, Vorderer Gesselkopf, im untersten Teil des Nordgrates W von der Hagener Hütte, ca. 2500 m, GF 8944/3, Kalkschieferschrofen, E-exponiert auf Moosen und Pflanzenresten, (4), 10. VIII. 1994, leg. J. Hafellner 33101 (GZU). – Ibid., (3), leg. J. Hafellner 33099 (GZU). – Kärnten, Nockberge, Hochplateau oberhalb der Zunderwand, ca. 2100 m, GF 9148/1, mergeliger Dolomit, auf Pflanzenresten, (3), 5. VII. 1990, leg. W. Petutschnig (GZU). – Kärnten, Gailtaler Alpen, Villacher Alpe, Zwölfer Nock, 46°36'05''N / 13°41'20''E, 2049 m, GF 9348/3, Kalk, auf Pflanzenresten, (4), 19. VI. 1993, leg. E. B. Timpe & W. Wetschnig (GZU). – Kärnten, Südalpen, Karnische Alpen, Gartnerkofel ca. 8 km SW von Hermagor, auf dem westlichen Seitengipfel, 46°34'20''N / 13°18'15''E, ca. 2180 m, GF 9445/2, Ausbisse aus Triaskalk in alpinen Rasen, auf Moosen und Pflanzenresten, (2), 1. IX. 2007, leg. J. Hafellner 75808 (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 toten Ästchen von *Salix retusa*, (4), 29. VI. 1997, leg. J. Hafellner 42216 (GZU). – Oberösterreich (Upper Austria), Nördliche Kalkalpen, Ennstaler Alpen, Haller Mauern, Großer Pyhrgas SE von Spital am Pyhrn, am Steig kurz SW unterhalb vom Gipfel, 47°39'10''N / 14°23'50''E, ca. 2160 m, GF 8352/1, niedere Kalkausbisse in alpinen Rasen, auf Moosen und Pflanzenresten, (3), 15. X. 2006, leg. J. Hafellner 70031 & L. Muggia (GZU). – Salzburg (Salisbury), Pinzgau, Hohe Tauern, Glockner-Gruppe, Bergkamm NW vom Kitzsteinhorn, ca. 2 km W ober der Krefelder Hütte, S-Grat der Hinteren Rettenwand, [47°12'40''N / 12°40'45''E], ca. 2680 m, GF 8742/3, Kalkschiefer, auf Moosen und Pflanzenresten, (4), 20. VII. 1996, leg. J. Hafellner 38208 & H. Wittmann (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 Kalkschiefer, auf Moosen und Pflanzenresten, (2), 27. VIII. 1996, leg. J. Hafellner 53926 (GZU). – Ibid., (4), 20. VII. 1996, leg. J. Hafellner 38308 & H. Wittmann (GZU). – Salzburg, Nationalpark Hohe Tauern, Glockner Gruppe, NW-Grat des Großen Margrötzen 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, (2), 5. VIII. 1996, leg. J. Hafellner 38159 & H. Wittmann (GZU). – Steiermark, Nördliche Kalkalpen, Dachstein-Gruppe, Grimming W von Stainach, im Gipfelbereich, 47°31'15''N / 14°01'00''E, ca. 2350 m, GF 8450/3, alpine Matten und Kalkfelsen, auf Pflanzenresten an Windkanten, (2), 10. VI. 2000, leg. J. Hafellner 76514 & A. Hafellner (GZU). – Steiermark, 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), 3. X. 2010, leg. J. Hafellner 76232, 76231 (GZU). – Steiermark, Nordalpen (Nördliche Kalkalpen), Ennstaler Alpen, Haller Mauern N von Admont, Hexenturm, im Gipfelbereich, 47°38'47''N / 14°28'55''E, ca. 2170 m, GF 8352/4, Kalkschrofen mit lückiger alpiner Vegetation, N-exponiert auf Moosen und Pflanzenresten, (4), 9. IX. 2006, leg. J. Hafellner 69488 (GZU). – Steiermark, Nordalpen (Nördliche Kalkalpen), Ennstaler Alpen, Gesäuseberge E von Admont, Gr. Buchstein, Nordsattel zwischen dem Gipfel und der Admonter Frauenmauer, 47°36'50''N / 14°35'55''E, ca. 2065 m, GF 8353/4, Polsterseggen-Silberwurzspaliere und niedere Kalkabbrüche, auf Moosen und Pflanzenresten an der Geländkante, (2), 19. VI. 2005, leg. J. Hafellner 69844 (GZU). –

Steiermark, Nördliche Kalkalpen, Ennstaler Alpen, Tamischbachturm NW von Hieflau, auf dem Gipfel, kurz NE unter dem Gipfelkreuz, 47°36'55''N / 14°42'00''E, ca. 2030 m, GF 8354/3, Kalkschrofen und Rasenfragmente, auf Moosen und Pflanzenresten in Carex firma-Rasen, (4), 23. VII. 2005, leg. J. Hafellner 69544 (GZU). – Ibid., (3), leg. J. Hafellner 69540 (GZU). – Steiermark, Nördliche Kalkalpen, Ennstaler Alpen, Tamischbachturm NW von Hieflau, auf dem Gipfel, kurz W vom Gipfelkreuz im Gratbereich, 47°36'55''N / 14°41'55''E, ca. 2030 m, GF 8354/3, niedere Kalkschrofen und lückige Carex firma-Rasen, auf Moosen und Pflanzenresten, (3), 23. VII. 2005, leg. J. Hafellner 69609 (GZU). – Steiermark, 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, N-exponiert auf Moosen und Pflanzenresten, (3), 13. IX. 2006, leg. J. Hafellner 69968 (GZU). – Ibid., (4), leg. J. Hafellner 69969 (GZU). – Steiermark, Nördliche Kalkalpen, Ennstaler Alpen, Gesäuseberge, Gsuchmauer ca. 9 km SW von Hieflau, auf dem schmalen Rücken kurz W vom Gipfel, 47°32'55''N / 14°39'55''E, ca. 2100 m, GF 8453/4, kleine Ausbisse aus Triaskalk in alpinen Matten, auf Moosen und Detritus auf dem wenig geneigten Rücken, (4), 11. IX. 2006, leg. J. Hafellner 69740 (GZU). – Steiermark, 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 firmae-Fragmente und Kalkschrofen, NW-seitig auf Pflanzenresten, (3), 3. VII. 2005, leg. J. Hafellner 69579 (GZU). –Steiermark, Eisenerzer Alpen, Leobner N von Wald am Schoberpaß, im Gratbereich am W Ende der Leobner Mauer, 47°29'55''N / 14°39'00''E, ca. 2000 m, GF 8553/2, paläozoische Kalke, auf Moosen und Pflanzenresten, (3), 31. VII. 1997, leg. J. Hafellner 42434 (GZU). – Steiermark, Eisenerzer Alpen, Kaiserschild-Massiv W von Eisenerz, Hochkogel, im Gipfelbereich, 47°32'20''N / 14°49'00''E, ca. 2100 m, GF 8454/4, Kalkschrofen und alpine Matten, SW-seitig auf Pflanzenresten, (4), 11. IX. 1999, leg. J. Hafellner 76508 (GZU). – Steiermark, Eisenerzer Alpen, Stadelstein SW von Eisenerz, N unter dem Gipfel auf dem Sattel zwischen Stadelstein und Schwarzenstein, 47°29'35''N / 14°51'30''E, ca. 1880 m, GF 8555/1, alpine Matten über paläozoischem Kalkschiefer, NW-seitig auf Moosen und Pflanzenresten, (2), 5. IX. 1997, leg. J. Hafellner 76512 & A. Hafellner (GZU). – Steiermark, Eisenerzer Alpen, Wildfeld, auf dem Gipfel, 47°29'N / 14°51'E, ca. 2040 m, GF 8555/1, Schrofen aus paläozoischem Kalk, auf Pflanzenresten in Felsspalten, (2), 8. VI. 1997, leg. A. Hafellner & J. Hafellner 40844 (GZU). – Steiermark, 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, (2), 23. IX. 1997, leg. J. Hafellner 43965 & A. Hafellner (GZU). – Steiermark, Eisenerzer Alpen, Reiting W von Trofaiach, im Bechlgraben, S unter dem Gipfel des Gößecks, [47°26'40''N / 14°54'10''E], ca. 1900 m, GF 8555, alpine Matte über Kalk, (3), 22. III. 1981, leg. J. Hafellner 9032 (herb. Hafellner). – Steiermark, Nördliche Kalkalpen, Hochschwab-Gruppe, Gipfel des Karlhoch Kogels N von Innerzwain, ca. 25 km N von Kapfenberg, [47°36'25''N / 15°09'30''E], 2096 m, GF 8356/4, auf Pflanzenresten, (4), 21. III. 1981, leg. J. Hafellner 9031 (GZU). – Steiermark, Nördliche Kalkalpen, Hochschwab-Gruppe, Fölzstein ca. 7,5 km NW von Aflenz, kurz W vom Gipfel am oberen Rand der S-exponierten Abbrüche, 47°35'45''N / 15°10'30''E, ca. 1900 m, GF 8457/1, Kalkfelsen und Caricetum firmae, auf Pflanzenresten / Gesteinsmoosen, (3), 20. IX. 2003, leg. J. Hafellner 76509 (GZU). – Steiermark, Nordalpen, Mürzsteger Alpen, Tonion Massiv ca. 9 km SE von Mariazell, Hochschnäbeltörl, 47°42'45''N / 15°23'35''E, ca. 1580 m, GF 8258/3, nieder Kalkschrofen und Fragmente von Polsterseggenrasen am Grat, über Pflanzenresten, (3), 8. VII. 2007, leg. J. Hafellner 83419 & A. Hafellner (GZU). – Steiermark, Nordalpen (Nördliche Kalkalpen), Mürzsteger Alpen, Veitsch Alpe N von Kindberg, am S-Rand des Plateaus N über dem Breitriegel, 47°38'50''N / 15°25'20''E, ca. 1840 m, GF 8358/4, kleine Ausbisse aus Triaskalk in Caricetum firmae / lückige Bestände von Pinus mugo, auf Pflanzenresten, (4), 30. IX. 2006, leg. J. Hafellner 76493 & L. Muggia (GZU). – Steiermark, Nordalpen, Mürzsteger Alpen, Proles Massiv, Kleiner Proles ca. 6,3 km NW von Mürzsteg, Geländerippe kurz S unterhalb vom Gipfel, 47°43'25''N / 15°26'50''E, ca. 1570 m, GF 8258/4, niedere Schrofen aus Triaskalk und Rasenbänder, auf Moosen und Pflanzenresten, (2), 1. VIII. 2008, leg. J. Hafellner 77137,

L. Muggia & A. Hafellner (GZU). – Ibid., (3), leg. J. Hafellner 77136, L. Muggia & A. Hafellner (GZU). – Steiermark, Zentralalpen, Niedere Tauern, Schladminger Tauern, SE-Abhänge der Steirischen Kalkspitze, W der Giglachseehütte zwischen Preuneggsattel und Akarscharte, 47°16’50’’–17’00’’N / 13°37’50’’–38’10’’E; 1970–2080 m, GF 8747/2; alpine Pioniergesellschaft über Schieferkalk, auf Moosen, (2), 27. VIII. 2001, leg. W. Obermayer 9199 (GZU). – Steiermark, Niedere Tauern, Schladminger Tauern, Znachsattel S ober der Giglachseehütte S von Schladming, NE-Hänge unmittelbar W ober dem Sattel, 47°16’30’’N / 13°38’20’’E, ca. 2060 m, GF 8747/2, Dryas-reiche Rasen über Kalk, auf Moosen und Pflanzenresten, (4), 27. VIII. 2001, leg. J. Hafellner 76507 (GZU). – Steiermark, Niedere Tauern, Schladminger Tauern, Kleinsölktal, NW vom Bauleiteck, E oberhalb der Striegleralm, W unter der Hasenohrenscharte, [47°16'25"N / 13°58'10"E], ca. 2250 m, schattig-feuchte, NNE-exponierte Marmorwand, auf Moosen, (2, 3), 21. IX. 1993, leg. A. Wilfling 204 & M. Möslinger (GZU). – Steiermark, Niedere Tauern, Wölzer Tauern, Hornfeldspitze E über dem Sölkpaß, steile NW-Hänge kurz unter dem Gipfel, 47°16’05’’N / 14°05’25’’E, ca. 2240 m, GF 8750/2, alpine Rasen über Silikatgestein mit Spuren von Kalk, auf Moosen und Pflanzenresten, (2), 22. IX. 2010, leg. J. Hafellner 41751 (herb. Hafellner). – Steiermark, Niedere Tauern, Wölzer Tauern, Berge NW von Oberwölz, Rettlkirchspitze SW über der Neunkirchner Hütte, im Bereich der kleinen Einsattelung zwischen Gipfel und E Vorgipfel, 47°15’40’’N / 14°07’50’’E, ca. 2430 m, GF 8750/2, niedere Marmorausbisse in alpiner Vegetation, auf Moosen und Pflanzenresten, (2), 27. IX. 2009, leg. J. Hafellner 76500 & A. Hafellner (GZU). – Steiermark, Niedere Tauern, Wölzer Tauern, Zinkenkogel N von Bretstein, am W-Grat kurz unter dem W Seitengipfel, 47°25’05’’N / 14°21’45’’E, ca. 1980 m, GF 8552/3, ruhendes Marmorblockfeld, auf Moosen und Pflanzenresten, (4), 20. VIII. 1993, leg. J. Hafellner 76503 & A. Wilfling (GZU). – Steiermark, Niedere Tauern, Wölzer Tauern, Zinkenkogel N von Bretstein, E unterhalb des Sattels am Südgrat, 47°25’00’’N / 14°22’40’’E, ca. 1980 m, GF 8552/3, auf steilen SE-exponierten Marmorschrofen, auf Moosen, (3), 19. VIII. 1993, leg. A. Wilfling 2153, J. Hafellner & M. Möslinger (GZU). – Steiermark, Niedere Tauern, Wölzer Tauern, Sandlerkogel N von Oberwölz, SW von Pusterwald, am NE-Abhang gegen das Plättental, ca. 2100 m, GF 8751/2; Marmorabbrüche, auf Moosen und Pflanzenresten, (3), 24. IX. 1993, leg. A. Wilfling 1315 & M. Möslinger (GZU). – Steiermark, Niedere Tauern, Wölzer Tauern, Berge ca. 5 km SW von Pusterwald, Schießeck, 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, (2), 11. VII. 2009, leg. J. Hafellner 75194, 75189 & A. Hafellner (GZU). – Steiermark, Niedere Tauern, Wölzer Tauern, Bergkette N von Lachtal ca. 9,5 km NE von Oberwölz, Kleiner Zinken, etwas SW unter dem Gipfel, 47°16’35’’N / 14°21’20’’E, ca. 2120 m, GF 8752/1, W-E streichende Marmorrippe, S-exp. auf Moosen und Pflanzenresten, (2), 1. IX. 2009, leg. J. Hafellner 76496 (GZU). – Steiermark, Niedere Tauern, Wölzer Tauern, 2,5 km N von Lachtal, 2 km NW der Kloserneuburger Hütte, Aufstieg vom Kleinen Zinken zum Hohen Zinken, [47°16'20"N / 14°21'00"E], ca. 2140 m, GF 8752/1; NW-exponierte Marmorschrofen, auf Erde, (3), 7. XI. 1994, leg. A. Wilfling 2741 & F. Wilfling (GZU). – Steiermark, 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, (2), 1. VIII. 2010, leg. J. Hafellner 75967 (GZU). – Ibid., (4), leg. J. Hafellner 75966 (GZU). – Steiermark, Steirisches Randgebirge, Stubalpe W von Köflach, Brandkogel ca. 3 km S vom Paß Gaberl, am waldfreien Rücken zwischen dem Alten Almhaus und dem Gipfel, 47°05’N / 14°56’E, ca. 1620 m, GF 8955/2, subalpine Weiden über Marmor, auf Moosen und Pflanzenresten, (3), 19. V. 1997, leg. J. Miadlikowska & J. Hafellner 42270 (GZU). – Ibid., (3), leg. J. Miadlikowska & J. Hafellner 42265 (herb. Hafellner). – Steiermark, Steirisches Randgebirge, Stubalpe, Wölkerkogel oberhalb vom Alten Almhaus, Gipfelbereich, [47°04'50"N / 14°55'30"E], 1670–1706 m, GF 8955/2; kleine Schrofen aus grobkristallinem Marmor, auf Felsmoosen, (3), 13. VIII. 1993, leg. A. Wilfling 2391 (GZU). – Steiermark, 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, (3), 17. VI. 2007, leg. J. Hafellner 76497 & L. Muggia (GZU). – Steiermark, Steirisches Randgebirge, Koralpe, im Seekar E unter dem Seespitz, ca. 17,5 km W ober Deutschlandsberg, 46°47’35’’N / 14°59’05’’E, ca. 1820 m, GF 9255/2, niedere Marmorausbisse umgeben von subalpinen Weiderasen und Zwergstrauchheiden, auf Moosen und Pflanzenresten, (3), 22. VIII. 2004, leg. J. Hafellner 76499 (GZU). – Steiermark, Steirisches Randgebirge, Grazer Bergland, Streberkogel S über Gasen, ca. 10 km W von Birkfeld, am SE-Ende des Gipfelrückens, 47°21’30’’N / 15°34’40’’E, ca. 1440 m, GF 8659/1, kleine Ausbisse aus Kalkschiefer in einer subalpine Weide, N-exponiert auf Moosen und Pflanzenresten, (3), 13. XI. 2011, leg. J. Hafellner 79081 (GZU). – Steiermark, Oststeirisches Hügelland, 2 km NW von Feldbach, Kornberger Teiche, c. 300 m, GF 9061/1, auf Zweigen von *Populus nigra*, (1), 24. VI. 1993, leg. B. Wieser 725 (GZU). – Tirol, Nordalpen, Karwendel, Hinterautal, Umgebung vom Kotwaldsee, 47°22’41’’N / 11°21’26’’E, ca. 1070 m, GF 8634/1, auf Borke von Salix spec., (1), 13. IX. 2008, leg. R. Türk 44065a-4 & H. S. Pfleger (GZU). – Tirol, Stubaier Alpen, Serles-Gruppe W ober Matrei am Brenner, Peilspitze S ober Maria Waldrast, am W-Grat E ober dem Kalbenjoch, 47°06’10’’N / 11°23’15’’E, ca. 2300 m, GF 8834/3, Dryas-Spaliere und niedere Kalkschrofen, auf Moosen und Pflanzenresten, (2), 1. VIII. 1996, leg. J. Hafellner 75535 (GZU). – Tirol, 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, (3), 4. IX. 1998, leg. J. Hafellner 46797 (GZU). – Vorarlberg, Rätikon, Lünerkrinne E über dem Lünersee, ca. 12 km SSW von Bludenz, Felsköpfe entlang des Grates kurz SE über dem Steig über den Sattel, 47°03’30’’N / 09°46’15’’E, ca. 2150 m, GF 8924/2, Felsschrofen aus mergeligen Triaskalken in alpiner Vegetation, auf Moosen und Pflanzenresten, (3), 5. VIII. 2008, leg. J. Hafellner 75188 (GZU). – Vorarlberg, Rätikon, Kreuzspitze WSW von Schruns, im Gipfelbereich, [47°02’35’’N / 09°48’45’’E], 2280–2353 m, auf Pflanzenresten, (4), GF 8925, Kieselkalk, 27. VII. 1986, leg. J. Poelt (GZU, under the name of the host). – **Italy**: Trentino-Alto Adige, prov. Bolzano (Südtirol), Southern Alps, Dolomiti, M. Seceda (Geisler Spitzen) NE of Ortisei (St. Ulrich), on the ridge just W above Forc Pana (Pana Scharte), 46°36’05’’N / 11°44’05’’E, ca. 2500 m; low outcrops of limestone in alpine vegetation, on bryophytes and plant debris, (2), 2. IX. 2002, leg. J. Hafellner 75195 (GZU). – Basilicata, Prov. Potenza, N-Abhänge des Monte Pollino, Piana dell Pollino NW Serra delle Ciavole, ca. 1900 m; Weiden und Felskuppen, dazwischen einzelne alte *Pinus leudodermis*, auf Holz von *Pinus leucodermis*, (1), 2. VI. 1979, leg. J. Hafellner 41733 (herb. Hafellner). – **Slovenia**: Southern Alps, Julian Alps, massif of Mangart NE of Bovec, beginning of the trail to the Planinski mejni prehod (Mangart saddle), 46°26’45’’N / 13°39’00’’E, c. 1980 m, alpine vegetation fragments and large boulders of limestone, on plant remnants, (2), 5. VII. 2003, leg. J. Hafellner 75268 (GZU). – Ibid., (4), leg. J. Hafellner 75269 (GZU). – Southern Alps, Julian Alps, massif of Mangart NE of Bovec, NE slopes of Mali vrh S opposite to Mangartska koča (Mangart refuge), 46°26’00’’N / 13°38’35’’E, c. 1960 m, alpine vegetation fragments and rocks of limestone, on plant remnants, (3), 5. VII. 2003, leg. J. Hafellner 75303 (GZU). – Southern Alps, Julian Alps, Koritnica valley NE of the village Log pod Mangartom, 46°24’50’’N / 13°38’00’’E, c. 700 m, mixed forest along the river bed, on dead branches of *Juglans regia* in the lower canopy, (1), 31. VII. 2003, leg. J. Hafellner 77576, 77577 (GZU). For additional specimens studied see Hafellner (1994).

Didymocyrtis epiphyscia Ertz & Diederich in Ertz et al., Fungal Diversity 74: 71 (2015).

≡ *Phoma physciicola* Keissl., Hedwigia 50: 294 (1911). – (non *Didymocyrtis physciicola* (Nyl.) Vain., Acta Soc. Fauna Flora Fennica 49 (2): 222, 1921).

Typus: Austria, Steiermark, near Gams bei Hieflau, c. 500 m alt., on branches of *Malus domestica* („Pyrus malus“), June 1910, K. von Keissler (W 1910/609 – holotype) n. v., fide Hawksworth (1981). Locality data from protologue.

Host of type: *Physcia aipolia* (th., ap.)

Full descriptions: anamorph: Keissler 1911: 294, Hawksworth 1981: 56, Ertz et al. 2015: 71.

Icon.: Keissler 1911: 295, Fig. 1 (drawings of habit, conidioma in longitudinal section, conidium); Ertz et al. 2015: 70, Fig. 5 a–f (photographs of habit, conidioma in longitudinal section, conidia).

Key characters for identification: Conidia ellipsoid, with one or two small guttules, (4.0–)4.6–6.1(–7.8)×(3.2–)3.5–4.2(–5.0) µm, length-width ratio (1.0–)1.2–1.6(–2.0). Conidia of strain on *Physcia adscendens* and *P. tenella* narrower, biguttulate or rarely multiguttulate, (3.7–)4.6–6.4(–8.0)×(2.0–)2.5–3.1(–3.5) µm, length-width ratio (1.2–)1.6–2.3(–3.5) (see Ertz et al. 2015: 72–73). The species concept applied here includes both strains (Ertz et al. 2015).

Notes: 1. The species is so far known only by its anamorph.

2. A new name was introduced because of the existence of the name *Didymocyrtis physciicola* (Nyl.) Vain., a heterotypic synonym of *Sphaerellothecium parietinarium* (Linds.) Hafellner & V.John, which made it impossible to combine *Phoma physciicola* Keissl. into *Didymocyrtis*.

3. For a possible teleomorph see also below under *Didymocyrtis physciae* (p. 67)!

Hosts: *Physcia aipolia* (th., apothecial margins) (1, T), *Physcia stellaris* (th., ap., apothecial margins) (2), *Physcia dubia* (th.) (3), *Physcia adscendens* (th.) (4), *Physconia distorta* (ap.) (5); *Physcia caesia*, *Anaptychia bryorum* (Zhurbenko 2009b, Urbanavichus & Urbanavichene 2014), *Physconia perisidiosa* (Puolasmaa et al. 2008), *Phaeophyscia orbicularis* (Brackel 2014). *Didymocyrtis epiphyscia* s.str. appears to be a specific invader of various species of foliose Physciaceae. For strains infesting species of the *Physcia adscendens* group, *Phaeophyscia* or *Physconia*, the specific identity is uncertain (Ertz et al. 2015). Morphoanatomically hardly distinguishable fungi have also been detected on other lichens, e.g. *Xanthoria parietina*, *Parmelia sulcata*, and *Parmelia squarrosa*.

Known distribution and previous records: The species in a narrow sense has so far been reported from the European countries Austria (Keissler 1911: 294, Hafellner 1994: 19, Hafellner et al. 2005a: 92, Hafellner & Zimmermann 2012: 49, Ertz et al. 2015: 71 f.), France (Diederich et al. 2014: 162, Roux et al. 2014: 851, Ertz et al. 2015: 71 f.), Great Britain (Hitch 1996: 62, Coppins et al. 2012: 102, Ertz et al. 2015: 71 f.), Luxemburg (Diederich et al. 2014: 162, Ertz et al. 2015: 71 f.). In North America it is known from Canada (Alstrup & Cole 1998: 226, Hafellner et al. 2002: 312, Ertz et al. 2015: 71 f.). By applying a broader species concept (including collections on Physciaceae other than *Physcia aipolia*), records for following additional countries have been traced: Albania (Hafellner & Kashta 2003), Belgium (Ertz et al. 2015), Finland (Puolasmaa

et al. 2008), Germany (Brackel 2007), Italy (Hafellner 1997), Portugal (Boom & Giralt 2012), European part of Russia (Urbanavichus & Urbanavichene 2014), Spain (Etayo 2010a), Sweden (Hawksworth 1981), Asian part of Russia (Zhurbenko 2009b), U.S.A. (Diederich 2003), and New Zealand (Hafellner & Mayrhofer 2007).

Exsiccata examined: Santesson, Fungi lichenicoli exs. 30 (GZU).

Further specimens seen:

EUROPE: **Austria:** Steiermark (=Styria), Nordalpen, Dachstein-Gruppe, Ramsau 4.4 km NNW of Schladming, 0.9 km NW of the church of the village Ramsau am Dachstein, NW of the farm Knoll, 47°25'39''N / 13°39'40''E, c. 1200 m alt., GF 8547/4, trees along meadows, on bark of *Acer pseudoplatanus*, (5), 16. II. 2010, leg. W. Obermayer no. 11896, det. J. Hafellner (GZU). – Steiermark, Gurktaler Alpen, Grebenzen, 4,6 km W of Neumarkt, Zeutschach, c. 0,5 km W of the church, 47°04'17''N / 14°21'37''E, GF 8952/1, c. 1060 m alt., solitary trees along meadow, on twigs of *Sorbus aucuparia*, (2), 29. XII. 2012, leg. W. Obermayer no. 12611, leg. J. Hafellner (GZU). – Steiermark, [Steirisches Randgebirge], Grazer Bergland, Hänge SW des Wirtshauses „Zum guten Hirten" oberhalb Mixnitz, auf *Fraxinus excelsior*, (1), 1. V. 1972, leg. J. Poelt no. 11147 (GZU). – Steiermark, Steirisches Randgebirge, Joglland, Miesenbach NE von Birkfeld, ca. 1 km S von Hafenscher, 47°22'10''N / 15°43'30''E, ca. 720 m, GF 8660/1, Kulturland, auf Zweigen von *Fraxinus excelsior*, (2), 18. IX. 1999, leg. J. Hafellner no. 62016 (GZU). For additional specimens studied see Hafellner (1997) and Hafellner & Zimmermann (2012).

Didymocyrtis foliaceiphila (Diederich, Kocourk. & Etayo) Ertz & Diederich in Ertz et al., Fungal Diversity 74: 73 (2015).

≡ *Phoma foliaceiphila* Diederich, Kocourk. & Etayo, Lichenologist 39: 159 (2007). – *Diederichomyces foliaceiphila* (Diederich, Kocourk. & Etayo) Crous & Trakunyingcharoen, in Trakunyingcharoen et al., IMA Fungus 5: 401 (2014).

Typus: Czech Republic, Central Bohemia, distr. Rakovník, Křivoklátsko protected landscape area, between Nezabudice and Roztoky villages, Nezabudické skály nature reserve, 50°01′ N, 13°51′ E, 255 m, in *Quercus petraea* forest below steep slope of rocky outcrops, 2002, J. Kocourková (PRM 896164 – holotype) n.v. Locality data from protologue.

Host of type: *Cladonia foliacea* (th.)

Full descriptions: anamorph: Diederich et al. 2007: 159–160, Lawrey et al. 2012: 206–207, Ertz et al. 2015: 73.

Icon.: Diederich et al. 2007: 160, Fig. 4 (photographs of infested squamules of *Cladonia foliacea*, conidia); Lawrey et al. 2012: 205, Fig. 4n–p (photographs of conidioma in longitudinal section, culture, conidia); Trakunyingcharoen et al. 2014: 403, Fig. 7 (photographs of culture with conidia, conidioma in longitudinal section, conidiogenous cells, conidia).

Key characters for identification: Conidia ellipsoid, biguttulate, with a small guttule near each apex, (5.0–)5.8–7.1(–7.5)×(2.0–)2.2–2.7(–3.0) µm, length-width ratio (2.0–)2.4–3.0(–3.5) (Ertz et al. 2015).

Notes: 1. The species is so far known only by its anamorph.

2. For distinguishing characters of the two *Didymocyrtis* species known on *Cladonia* hosts, *D*. *cladoniicola* and *D. foliaceiphila,* see above under D. *cladoniicola*.

Hosts: *Cladonia coniocraea* (th.) (1), *Cladonia macroceras* (th.) (2), *Pseudevernia furfuracea* (th.) (3); further reported hosts: *Cladonia convoluta*, *C*. *fimbriata*, *C*. *foliacea* (T), *C*. *furcata*, *C*. *pyxidata*, *C*. *rangiformis*, *C*. *squamosa*, *Parmelia sulcata*, *P*. *saxatilis* (Brackel 2015, Ertz et al. 2015, Roux et al. 2014). *Cladonia coniocraea*, *C*. *macroceras*, and *Pseudevernia furfuracea* are additions to the host spectrum. Records on Parmeliaceae are rare so far. Most material of a *Phoma*-like fungus on species of this family belongs to *Didymocyrtis melanelixiae*. The infection detected on *Pseudevernia furfuracea* has conidia fitting both in size and shape to *Didymocyrtis foliaceiphila*. A confirmed record of a genetically uniform population infesting both *Cladonia squamosa* and *Parmelia sulcata* (Ertz et al. 2015) indicates that the host spectrum is wider than originally assumed.

Known distribution and previous records: The species has so far been reported from Austria (Berger & Priemetzhofer 2010), Belgium (Van den Broeck et al. 2012: 12, Lawrey et al. 2012: 206 f.), Czech Republic (Diederich et al. 2007: 159 f.), France (Diederich et al. 2007: 159 f.), Germany (Brackel 2010: 22, 2014: 265), Italy (Brackel 2011: 80, 2015: 254), Lithuania (Motiejūnaitė et al. 2011: 42), Luxemburg (Diederich et al. 2007: 159 f.), Netherlands (Diederich et al. 2007: 159 f.), Spain (Etayo 2008, 2010b: 318). It is herewith reported as an addition to the mycoflora of Kosovo.

Exsiccata examined: -.

Further specimens seen:

EUROPE: **Austria:** Niederösterreich (=Lower Austria), Nördliche Kalkalpen, Göller-Gruppe, Südhänge der Weißmäuer E vom Lahnsattel, 47°46’30’’N / 15°31’30’’E, ca. 1000 m, GF 8259/1, Buchen-Tannen-Fichtenwald, auf Holz liegender, abgestorbener, morscher Baumstämme, (1), 23. IV. 1994, leg. J. Hafellner no. 32525 (herb. Hafellner). – Steiermark [Styria], [Steirisches Randgebirge], Gleinalpe S von St. Michael, SW-exponierter Rücken zwischen Kreuzsattel und Eiblkogel, 47°15’10’’N / 15°05’25’’E, ca. 1780 m, GF 8756/4, Blockschutthalde und umgebende Zwergstrauchheiden, in Zwergstrauchheiden auf Erdblößen, (2), 27. X. 2001, leg. J. Hafellner no. 57816 (herb. Hafellner). – **Kosovo**: Albanian Alps / Bjeshkët e Nemuna e Kosovës, Bogićevica, west of Deçan, summer mountain village Bjeshket e Belegut, northern slopes of Maja e Ropës (Maja e Rops), 42°34’42’’N / 20°05’50’’E, 2244 m, dwarf shrub heath with siliceous rock outcrops, on twigs of dwarf shrub, (3), 21. VIII. 2012, leg. H. Mayrhofer no. 19305a & H. Zekaj (GZU).

Didymocyrtis melanelixiae (Brackel) Diederich, R.C.Harris & Etayo in Ertz et al., Fungal Diversity 74: 74 (2015).

≡ *Phoma melanelixiae* Brackel, Herzogia 24: 81 (2011).

Typus: Italy, Basilicata, Prov. di Potenza, Monte Vulture, near “Femmina Morta”, 40°57’24’’N, 15°37’17’’E, 1145 m, in mixed forest of oaks, elders and maples, on the bark of *Acer pseudoplatanus*, 22 Aug. 2010, W. & G. v. Brackel 5658 (M – holotypus) n.v. Locality data from protologue.

Host of type: *Melanelixia glabra* (th.)

Full descriptions: teleomorph: Ertz et al. 2015: 74–75; anamorph: Ertz et al. 2015: 75, Brackel 2011: 81.

Icon.: Brackel 2011: 84, Fig. 10 (drawing of conidioma wall in longitudinal section, conidiogenous cells, conidia), Fig. 11 (photograph of habit); Ertz et al. 2015: 75, Fig. 7a–e (photographs of habit, asci with ascospores, conidia).

Key characters for identification: Ascospores ± uniseriate to half-overlapping, medium to dark brown, (1–)2(–3)-septate, 11.5–15×4–5.5 µm, the middle cell slightly wider than the end cells, slightly constricted at the septa, torus indistinct, with a distinct verruculose sculpture visible in light microscopy. Conidia broadly ellipsoid to subspherical, with one large guttule or rarely two smaller guttules, (3.5–)3.8–5.1(–6.2)×(2.8–)3.2–3.8(–4.3)µm, length-width ratio (1.0–)1.1–1.5(–1.8) (Ertz et al. 2015).

Notes: 1. The species was originally described on type material containing only the anamorph. The teleomorph has been detected in two specimens with *Punctelia* as host and originating from the U.S.A.

Hosts: *Melanelixia glabratula* (th.) (1), *Platismatia glauca* (th.) (2), *Parmelia saxatilis* (th.) (3), *Cetraria islandica* (th.) (4), *Evernia prunastri* (th.) (5); further reported hosts: on the thallus of various Parmeliaceae, including species of *Canoparmelia*, *Cetrelia*, *Hypotrachyna*, *Melanelixia* (e.g. *M. glabra* (T)), *Parmelia* s.str., *Parmotrema*, *Platismatia*, *Pseudevernia*, *Punctelia* and *Usnea* (Ertz et al. 2015). *Cetraria islandica* and *Evernia prunastri* are added to the host spectrum.

Known distribution and previous records: The species has so far been reported from Europe (Belgium, France, Italy, Spain, Switzerland, United Kingdom: Scotland), North America (Canada: British Columbia and New Brunswick, USA: Georgia, Maine and North Carolina), South America (Ecuador) and from an archipelago in the Indian Ocean (La Reunion) (Ertz et al. 2015). It is herewith reported as an addition to the mycoflora of Austria.

Exsiccata examined: -.

Further specimens seen:

Anamorph: **EUROPE**: **Austria:** Salzburg (Salisbury), Niedere Tauern, Schladminger Tauern, Lungau, Weißpriachtal N von Mauterndorf, unterste Hänge am Gurpitschbach 5 km NW von Weißpriach, Grauerlenbestände am Gurpitschbach, [47°12’30’’N / 13°39’40’’E], 1150 m, GF 8747/4, auf *Alnus incana*, (5), 8. IX. 1981, leg. J. Hafellner no. 10266 (GZU). – Steiermark (Styria), Nördliche Kalkalpen, Hochschwab-Gruppe, Fölz NW von Aflenz, im untersten Teil des Mitterbachgrabens W vom Ghf Schwabenbartl, [47°34’15’’N / 15°11’30’’E], ca. 860 m, GF 8457/1, Buchen-Tannen-Fichtenwald, auf Borke von *Salix* spec., (3), 27. X. 1993, leg. J. Hafellner no. 31133 (GZU). – Steiermark (Styria), Steirisches Randgebirge, Koralpe, Reinisch Kogel NW von Stainz, W ober dem Wirtshaus Klug [Klugbauer], [46°56’45’’N / 15°09’20’’E], ca. [1060–]1100 m, GF 9056/4, Tannen-Fichtenwald, auf Totholz, (2), 22. V. 1984, leg. J. Hafellner no. 11256 (herb. Hafellner). –Tirol (Tyrol), Tuxer Alpen, Wattener Lizum S von Wattens, am W-Fuß der Kalkwand SSE ober der Lizumer Hütte, [47°09’20’’N / 11°38’55’’E], ca. 2200 m, GF 8835/4, Kalkblockschutthalde, in erdigen Spalten großer Blöcke, (4), 7. VII. 1992, leg. J. Hafellner no. 23451 (herb. Hafellner). – **France:** Korsika, Dept. Haute-Corse, an der Straße von Vivario auf den Col de Vizzavona, ca. 1 km NE von Tattone, ca. 830 m alt., Kastanienhain in einer Weide, auf Stammborke von *Castanea sativa*, (1), 3. XI. 1993, leg. J. Hafellner no. 31611 (GZU).

Didymocyrtis physciae (Brackel) Hafellner comb. nov. MB 815444

≡ *Merismatium physciae* Brackel, Ber. Bayer. Bot. Ges. 80: 15 (2010). – *Pleospora physciae* (Brackel) Hafellner & E.Zimm., Herzogia 25(1): 50 (2012).

Typus: Germany: Bayern (Bavaria), Kreis Eichstätt, Parkplatz Gelbelsee (W) an der BAB 9, 48°57'0''N/11°25'49''E, 520 m, MTB 7034/2, an gepflanzter Esche in lockerer Baumgruppe, 12. III. 2010, W. v. Brackel (M – Holotypus) n.v. Locality data from protologue.

Host of type: *Physcia adscendens* and *P. tenella* (th.)

Full descriptions: teleomorph: Brackel 2010: 15–16, Hafellner & Zimmermann 2012: 50–52.

Icon.: Brackel 2010: 16, Fig. 5 (photograph of infested *Physcia thallus*), 17, Fig. 6 (drawing of asci, ascospores); Hafellner & Zimmermann 2012: 51, Fig. 1 (photographs of infested thallus, ascoma in longitudinal section, hymenium, submedian section of ostiolar region, ascomatal wall in surface view, paraphysoids, asci of various age, ascospores of various age).

Key characters for identification: Ascospores at first pale brown, later brown, upper half somewhat broader than the lower one, slightly constricted at the septa, with 3 – 4 transsepta and 0 –1 longisepta per level, 4 –7 cells visible in optical section, 14.5 –16.5 × 6 –7 µm, with a thin perispore that is not always clearly visible (Hafellner & Zimmermann 2012).

Notes: 1. Although not yet confirmed by molecular data, it appears very likely that the species belongs to *Didymocyrtis*. By introducing the combination, we want to draw attention to the possibility that *Didymocyrtis* may include species with muriform ascospores. The muriform ascospores could also be responsible for the ascus shape in the species, being not so narrowly cylindrical as in other *Didymocyrtis* species.

2. The species is so far only known by its teleomorph. It cannot be excluded that a *Phoma*-like fungus known from *Physcia* hosts is conspecific. The most likely options are *Phoma physciicola* Keissl. and the hitherto unnamed strain of *Didymocyrtis epiphyscia* s.ampl. (Ertz et al. 2015: 72). *Didymocyrtis physciae* would constitute the correct name for both holomorphs as a transfer of *Phoma physciicola* is not possible because of the existence of the name *Didymocyrtis physciicola* (Nyl.) Vain., and it has priority over the recently introduced replacement name *Didymocyrtis epiphyscia* Ertz & Diederich (see above). As long as the identity is not proven, we prefer to maintain both species names separate.

Hosts: *Physcia adscendens* (th.) (1, T), *Physcia tenella* (th.) (2); *Physcia stellaris* (th., apothecial margins) (3) (Brackel 2010). – So far *Didymocyrtis physciae* appears to be a specific invader of various *Physcia* species. The record on *Xanthoria parietina* (Otte & Wagner 2012) needs a critical re-evaluation.

Known distribution and previous records: The species has so far only been reported from Austria (Hafellner & Zimmermann 2012), Belgium (Diederich et al. 2012), Germany (Brackel 2010, 2014, Hafellner &

Zimmermann 2012), Slovenia (Hafellner & Zimmermann 2012), and Switzerland (Hafellner & Zimmermann 2012).

Exsiccata examined: -.

Further specimens seen:

EUROPE: **Austria:** Steiermark (= Styria), Steiermark, Oststeirisches Hügelland, Graz, Botanischer Garten NW der Schubertstraße, Postgrund, 47°04'58''N / 15°27'25''E, ca. 380 m, GF 8958/2, Streuobstwiese mit alten Obstbäumen im Umfeld des Bauerngartens, auf abgestorbenen Kronenzweigen von *Juglans regia*, (1), 19. VI. 2011, leg. J. Hafellner no. 77684 (GZU). – Steiermark, Oststeirisches Hügelland, Graz, 150 m SE of the pond Hilmteich, 47°05'00''N / 15°27'45''E, GF 8958/2, ca. 400 m alt., mixed forest, on bark of strongly decayed twigs fallen to the ground, (1), 20. III. 2013, leg. W. Obermayer no. 12737, det. J. Hafellner (GZU).

Didymocyrtis pseudeverniae (Etayo & Diederich) Ertz & Diederich in Ertz et al., Fungal Diversity 74: 77 (2015).

≡ *Macrophomina pseudeverniae* Etayo & Diederich, Mycotaxon 60: 419 (1996). – *Diederichia pseudeverniae* (Etayo & Diederich) D. Hawksw., Lichenologist 35: 206 (2003).

Typus: Spain, Huesca, road Sabiñánigo to Boltaña, Perto del Serrablo, Sierra del Gabardón, km 39 near Laguarta, 1200 m, 5 July 1993, J. Etayo 12597 (MA-Lich – holotype; hb. Etayo – isotype) n.v. Locality data from protologue.

Host of type: *Pseudevernia furfuracea* (th.)

Full descriptions: anamorph: Etayo & Diederich 1996: 419–420, Ertz et al. 2015: 77.

Icon.: Etayo & Diederich 1996: 420, Fig. 2 (drawings of conidioma, conidiogenous cells, conidia); Ertz et al. 2015: 75, Fig. 7 f–h (photographs of habit, conidioma in longitudinal section, conidia), 79, Fig. 9 e–f (culture, conidia).

Key characters for identification: Conidia subcylindrical, ellipsoid or irregular in form, with numerous small guttules, (14–)16–22(–26)×6–9 µm (Ertz et al. 2015).

Notes: 1. The species is so far known only by its anamorph.

2. Within *Didymocyrtis* the species is peculiar by its conidia dimensions.

Hosts: *Pseudevernia furfuracea* (th.) (1, T). The species appears to be a specific invader of *Pseudevernia* species.

Known distribution and previous records: The species has so far been reported from the European countries Czech Republic (Brackel 2009: 13), Great Britain (Hitch 1997: 52, 2011: 82, 2012a: 73, 1912b: 78), Germany (Brackel 2014: 110), Italy (Brackel 2013: 145, Motiejūnaitė & Grochowski 2014: 195), Latvia (Motiejūnaitė & Grochowski 2014: 195), Lithuania (Motiejūnaitė et al. 2011: 41), Spain (Etayo & Diederich 1996: 419 f., Ertz et al. 2015: 77), and Switzerland (Ertz et al. 2015: 77). It is herewith reported as an addition to the mycoflora of Austria and France.

Exsiccata examined: -.

Further specimens seen:

EUROPE: **Austria:** Steiermark (Styria), Steirisches Randgebirge, Joglland, Kulm-Massiv, Oberhänge der Feistritz Klamm W gegenüber von Schloß Herberstein, Geierwand, 47°12’55’’N / 15°47’50’’E, ca. 600 m alt., GF 8760/4, Silikatschrofen mit lückigem Eichen-Föhrenwald, auf Borke von *Quercus robur*, (1), 25. IX. 1999, leg. J. Hafellner no. 62020 (GZU). – **France**: Corsica, Dept. Haute-Corse, Asco Tal, Forêt de Carrozzica, SW ober dem Ort Asco, ca. 940 m; lockerer *Pinus nigra*-Wald mit Felsblöcken, auf Borke von *Pinus nigra* am Stammgrund, (1), 2. XI. 1993, leg. J. Hafellner no. 41838 (GZU).

Didymocyrtis ramalinae (Roberge ex Desm.) Ertz, Diederich & Hafellner in Ertz et al., Fungal Diversity 74: 77 (2015).

≡ *Sphaeria ramalinae* Roberge ex Desm., Ann. Sci. Nat., Bot., 3. sér., 11: 354 (1849). – *Leptosphaeria ramalinae* (Desm.) Sacc., Syll. Fung. 2: 84 (1883). – *Heptameria ramalinae* (Desm.) Cooke, Grevillea 18 (86): 33 (1889). – *Phaeospora ramalinae* (Desm.) Vouaux, Bull. Soc. Mycol. France 29: 74 (1913).

Typus: France, without locality and date, on *Ramalina fastigiata* (th.), leg. Roberge (?PC – holotypus) n.v. Locality data from protologue.

Host of type: *Ramalina fastigiata* (th.)

= *Phoma ficuzzae* Brackel, Sauteria 15: 109 (2008). – *Diederichomyces ficuzzae* (Brackel) Crous & Trakunyingcharoen in Trakunyingcharoen et al., IMA Fungus 5(2): 401 (2014).

Typus: Italy, Sicily, Prov. Palermo, Bosco della Ficuzza, road from Ficuzza to S, 37°52′00.6″ N, 13°23′17.3″ E, 910 m, in grazed coppice forest mainly of oaks and ashes, on the bark of *Pyrus amygdaliformis*, 9 Aug. 2006, Brackel (hb. IVL 3983 – holotype; M-0044890 – isotype) n.v. Locality data from protologue.

Host of type: *Ramalina fraxinea* (th., apothecial margin).

Full descriptions: teleomorph: Vouaux 1913: 74, Ertz et al. 2015: 77–78; anamorph: Brackel 2008a: 109, Lawrey et al. 2012: 206, Ertz et al. 2015: 78–79.

Icon.: Berlese 1892: 54, Tab. XL, Fig. 1 (drawings of ascoma in longitudinal section, ascus, ascospores); Lawrey et al. 2012: 205, Fig. 4l–m (photographs of culture, conidia); Ertz et al. 2015: 78, Fig. 8a–d (photographs of habit, asci with ascospores, conidia), 79, Fig. 9i (culture).

Key characters for identification: Ascospores ± uniseriate to half-overlapping, dark brown, 3-septate, some only with 1 or 2 septa (<1 %), (13–)14–20×5–6.5(–7) µm, the upper half spore (namely the second cell) slightly wider than the lower one, not or slightly constricted at the septum, torus indistinct, with distinct verruculose sculpture visible in light microscopy. Conidia ellipsoid, biguttulate, with a small guttule near each apex, 5–7×3–4 µm, length-width ratio 1.5–2 (Ertz et al. 2015).

Notes: 1. The conspecificity of the teleomorph *Didymocyrtis ramalinae* and its anamorph (*Phoma ficuzzae*) has been proven by DNA sequence data (Ertz et al. 2015).

Hosts of the teleomorph: *Ramalina fastigiata* (th., apothecial margins) (1, T), *Ramalina celastri* (th., ap.) (2), *Ramalina exiguella* (th., ap.) (3), *Ramalina* spec. (th.) (4); further reported hosts: *Ramalina calicaris*, *R*. *farinacea*, *R*. *lacera*, *R*. *pollinaria*, *R*. *subgeniculata* (Ertz et al. 2015). *Didymocyrtis ramalinae* appear to be a specific invader of various *Ramalina* species.

Hosts of the anamorph: *Ramalina* spec. (th.) (4); further reported hosts: *Ramalina fraxinea* (T), *R*. *fastigiata* (Ertz et al. 2015), *R*. *calicaris* (Khodosovtsev 2013), *R*. *farinacea* (Brackel 2008b).

Known distribution and previous records of the teleomorph: The species has so far been reported from the European countries Denmark (Alstrup et al. 2004: 46, Søchting et al. 2007: 43), France (Desmazières 1849: 354, Ertz et al. 2015: 77 ff.), Great Britain (Hitch 2011: 76, Ertz et al. 2015: 77 ff.), Italy (Brackel 2008a: 107, 2008b: 186, 2011: 72, 2015: 241, Ertz et al. 2015: 77 ff.), Lithuania (Motiejūnaitė et al. 2012: 93), Luxemburg (Diederich 1989: 155, 1990: 310 f., Ertz et al. 2015: 77 ff.), Poland (Kukwa et al. 2013: 162), Portugal (Boom & Giralt 2012: 183), Russia (Urbanavichus & Urbanavichene 2015: 188), Spain (Etayo 1996a: 101, 1996b: 116, 2010a: 30, 2011: 46, Santesson 2001: 7, Etayo & López de Silanes 2009: 19, Boom & Etayo 2014: 51, Burgaz 2014: 68, Ertz et al. 2015: 77 ff.), and Sweden (Ertz et al. 2015: 77 ff.). Furthermore it is known from the Canary Islands (Etayo 1996a: 101, Hafellner 1996b: 4, Ertz et al. 2015: 77 ff., Boom & Clerc 2015: 3), South Africa (Ertz et al. 2015: 77 ff.), and Australia (Ertz et al. 2015: 77 ff.).

Known distribution and previous records of the anamorph: So far *Phoma ficuzzae* has been recorded from the European countries France (Lawrey et al. 2012: 206, Ertz et al. 2015: 77 ff.), Germany (Brackel 2014: 264 f.), Great Britain (Ertz et al. 2015: 77 ff.), Italy (Brackel 2008a: 109 ff., 2008b: 188, 2008c: 65, 2011: 80), Lithuania (Motiejūnaitė et al. 2011: 42), Poland (Kukwa et al. 2013: 163), Portugal (Boom & Giralt 2012: 191), Sweden (Thell et al. 2014: 22), and Ukraine (Khodosovtsev 2013: 85).

Exsiccata examined: Hafellner, Lich. Biota no. adhuc ined. (BCN, BR, CANB, E, GZU, LE, M, NY, PRM, UPS).

Further specimens seen:

Teleomorph: **EUROPE**: **Africa: Canary Islands:** La Palma, E ober El Paso, bei der Abzweigung nach La Cumbrecita, 28°38’40’’N/17°51’30’’W, c. 850 m alt., altes Kulturland, auf Zweigen von *Amygdalus communis*, (4), 1. XII. 1991, leg. J. Hafellner 29536 (herb. Hafellner) – to be distributed in Hafellner, Lichenicolous Biota. – **South Africa:** Cape Province, south coast, about 21 km ENE of Pletttenberg Bay, Nature’s Valley, near the bridge over the Grootrivier (road between Bloukrans and the village Nature’s Valley, 34°58’S /23°34’E, coastal forest, (3), 27. XI. 1987, leg. W. Wetschnig & U. Wetschnig (GZU). – **Australasia: Australia:** Queensland, Bunya Mountains, about 56 km NE of Dalby, NE of the J. S. Fisher Lookout, 26°53’S/151°37’E; about 1050 m alt., edge of a subtropical rainforest, on branches of *Acacia* spec., (2), 3. IX.1986, leg. J. Hafellner 18942 & R. Rogers (herb. Hafellner). – Queensland, Bunya Mountains, on the road from the ridge to Maidenwell, 1,8 km NE of the intersection, 26°53’S/151°40’E, about 920 m alt., eucalypt forest, on branches of tall shrub, (2), 3. IX. 1986, leg. J. Hafellner 19718 & R. Rogers (GZU). – Queensland, Great Dividing Range, on the road to Bald Mountain about 7 km NE of Mt. Colliery, E of Warwick, 28°15’S / 152°23’E, c. 1000 m alt., small pocket of remaining rain forest on the ridge, on branches of unnamed

tree, (2), 7. IX. 1986, leg. J. Hafellner 16999 & N. Stevens (GZU). For further collections stored in GZU see Ertz et al. (2015).

Anamorph**: Europe: Italy:** Sardinia, Prov. Sàssari, Mte. Limbara SE von Témpio Pausania, c. 1250–1300 m alt., Granitfelsen, (4), 7. V. 1986, leg. J. Poelt (GZU).

Didymocyrtis slaptoniensis (D.Hawksw.) Hafellner & Ertz in Ertz et al., Fungal Diversity 74: 80 (2015).

≡ *Polycoccum slaptoniensis* D.Hawksw., Lichenologist 26(4): 342 (1994).

Typus: Great Britain, England, South Devon, Slapton, Slapton Ley National Nature Reserve, east end of Duck Marsh near The Causeway, on *Sambucus nigra,* 2. X. 1993, leg. D. L. Hawksworth (IMI 359711–holotype) n.v. Locality data from protologue.

Host of type: *Xanthoria parietina* (th.)

Full descriptions: teleomorph: Hawksworth 1994: 342, Ertz et al. 2015: 80; anamorph: Ertz et al. 2015: 80.

Icon.: Hawksworth 1994: 343, Fig. 3 (drawings of galls, ascoma wall in vertical section, ascus tip, ascospores), Ertz et al. 2008: 46, Fig. 7 (photograph of habit of ascomata), Ertz et al. 2015: 70, Fig. 5j–l (photograph of habit of conidiomata and ascomata, conidia), Hitch 2015: 68 (photograph of habit).

Key characters for identification: Ascospores ± uniseriate, pale brown, 1-septate, (11–)13–15×(5.5–)6–7 µm, with verruculose sculpture and with torus protruding on the outside in semimature spores (torus of mature spores not protruding any further). Conidia ellipsoid to oblong, many somewhat inequilateral, (5–)6–8(–9)×2.5–3.5 µm, with two small guttules near the ends, length-width ratio c. 2 (Ertz et al. 2015).

Notes: 1. The conspecificity of the teleomorph and the anamorph is not yet proven by sequence data, but both fructifications are extremely similar in their appearance (e.g., when developed on the thallus both with peculiar thalline collar). The fruiting bodies of the teleomorph can be distinguished from the *Phoma* anamorph in surface view under the hand lens or dissecting microscope by its size, being about twice as large as the conidiomata. The overall aspect is very similar. Both can occur together on a single thallus or on neighbouring thalli (e.g. Obermayer 13130) and, although not yet proven by molecular data, are likely to constitute teleomorph and anamorph of a pleomorphic ascomycete.

2. The anamorph of *Didymocyrtis slaptoniense* can be separated from the the other *Phoma* anamorphs occurring on *Xanthoria parietina* by its strongly protruding conidiomata obtected by a thalline layer of the host reaching almost up to the ostiole and by its conidia of rather narrow ellipsoidal shape measuring (5–)6–8(–9)×2.5–3.5 µm (sec. Vouaux 4–6×2–3 µm) in diam.

3. The swellings caused by the space-demanding process, when the ascomata develop on the thallus of the host, were called “tuberculiform galls” by Hawksworth (1994). However, these tiny thickenings are not galls in the narrow sense, which, according to the “Dictionary of the Fungi”,

should be a "…deformation that occurs in response to the stimulus of a foreign organism…" and therefore constitute an abnormal outgrowth of host tissues caused by a parasite. We think that in the specific case no growth processes are involved and therefore part of the definition for galls is not fulfilled, as the ascomata remain obtected only by a thin layer of host plectenchyma. This interpretation is also supported by the fact, that no galls are formed when ascomata develop in the hymenia.

4. The hamathecial elements were regarded to be pseudoparaphyses by Hawksworth (1994). However, as we could not prove the formation of filaments growing downwards in young pseudothecia, we prefer to call these elements paraphysoids.

Hosts of the teleomorph: *Xanthoria parietina* (1, T) (th., apothecial margins, more rarely in the hymenia). *Didymocyrtis slaptoniensis* appears to be a specific invader of species belonging to the *Xanthoria parietina* group.

Hosts of the anamorph: *Xanthoria parietina* (1) (th., apothecial margins, more rarely also in the hymenia). Records on other hosts (*Phaeophyscia orbicularis*) are doubtful and may belong to *Didymocyrtis epiphyscia* s.l. (Ertz et al. 2015).

Known distribution and previous records of the teleomorph: The species has so far been reported from the European countries Austria (Berger et al. 2015: 8, Ertz et al. 2015: 80 f.), Belgium (Ertz et al. 2008: 45 f., Ertz et al. 2015: 80 f.), France (Gardiennet 2012: 107, Roux et al. 2014: 911, Ertz et al. 2015: 80 f.), Germany (Brackel 2009: 31, 2014: 281 f., Cezanne & Eichler 2015: 181, Cezanne et al. 2013: 191, Kocourková & Brackel 2005: 6), Great Britain (Hawksworth 1994: 342, Hitch 2015: 68), Italy (Brackel 2008c: 65, 2015: 256), Liechtenstein (Ertz et al. 2015: 80 f.), Luxemburg (Diederich et al. 2014: 163, Ertz et al. 2015: 80 f.), Portugal (Boom & Giralt 2012: 192), and Switzerland (Ertz et al. 2015: 80 f.).

Known distribution and previous records of the anamorph: Under the assumption that records of "*Phoma epiphyscia*" on *Xanthoria parietina* constitute records of the anamorphic state of *Didymocyrtis slaptoniensis* (but see also the treatment of *Didymocyrtis epiphyscia* s.l. by Ertz et al. 2015: 72 f.), it is so far known from the following European countries: Austria (Etayo & Berger 2009: 113 f., Keissler 1930: 541 f. as *Phoma lichenis*; a record which probably refers to *Phoma epiphyscia*), Estonia (Aptroot et al. 2005: 20), France (Vouaux 1914: 197), Germany (Brackel 2007: 14, 2014: 263 f.), Italy (Brackel 2008b: 187 f., 2011: 79, 2015: 254), Spain (Etayo 2010a: 40, 2010b: 318), Sweden (Santesson 1993: 166) and Ukraine (Kondratyuk et al. 2010: 440). From Africa records of *Phoma epiphyscia* that might belong here have already been published from Morocco (Werner 1939: 51) and the Canary Islands (Boom & Clerc 2015: 4).

Exsiccata examined: Hafellner, Lichenicolous Biota no. adhuc ined. (BCN, BR, CANB, E, GZU, LE, M, NY, PRM, UPS).

Further specimens seen:

Teleomorph: **EUROPE**: **Austria**: Kärnten (Carinthia), Zentralalpen, Saualpe W von Wolfsberg, ca. 1 km W von St. Michael an der Straße nach Lading, 46°50'05''N / 14°47'10''E, ca. 550 m, GF 9154/4, Obstbäume in einer Standweide, auf nach einem

Sturm jüngst zu Boden gefallenen, morschen Zweigen von *Juglans regia*, (1), 25. XII. 2010, leg. J. Hafellner no. 76742 (herb. Hafellner). – Niederösterreich (Lower Austria), Wienerwald, am südwestlichen Stadtrand von Mödling, am NE-Fuß des Anninger-Massivs, 48°04'35''N / 16°16'50''E, ca. 275 m, GF 7963/2, einzelne Bäume am Rand eines Weingartens, auf abgestorbenen, jüngst zu Boden gefallenen Kronenästen von *Juglans regia*, (1), 26. X. 2011, leg. J. Hafellner no. 79014 (herb. Hafellner). – Oberösterreich (Upper Austria), Donautal, Engelhartszell, Weichholzau bei Oberranna, 290 m alt., GF 7548, (1), 5. III. 2011, leg. F. Berger no. 25262 (herb. Berger). – Steiermark (Styria), Sausal, Kitzeck ca. 9 km W von Leibnitz, am NW Ortsrand, 46°47'35''N / 15°26'00''E, ca. 480 m, GF 9258/2, alter Obstgarten, an Zweigen von *Juglans regia*, (1), 22. I. 2011, leg. J. Hafellner no. 77058 (herb. Hafellner). For additional specimens already studied and preserved in GZU see Ertz et al. (2015).

Anamorph: **EUROPE**: **France**: Rhône-Alpes, Haute-Savoie, Western Alps, Bornes Massif (Le Massif des Bornes), Burzier NW above Sallanches, SE below the parking area at Route de Doran, 45°57'22''N / 6°36'42''E, elevation c. 935 m, isolated groups of trees at the edge of meadows, on branches in lower canopy of *Fraxinus excelsior*, (1), 17. VIII. 2011, leg. J. Hafellner no. 82565 (GZU).

Taxa excluded from *Didymocyrtis* to be further studied

Polycoccum stellulatae (Vouaux) Hafellner comb. nov. MB 815445

≡ *Didymosphaeria bryonthae* var. *stellulatae* Vouaux, Bull. Soc. Mycol. France 29: 111 (1913).

Typus: [France], "Sur thalle de *Buellia stellulata* à Colombières dans l'Hérault (A. de Crozals)". Type not located. Locality data from protologue.

Host of type: *Buellia stellulata* (th.)

Key characters for identification: [extracted from protologue and own observations]: Ascomata scattered, [not gall inducing], many, usually 1–2 per areole, 100–150 µm in diam., almost completely immersed in the host thallus. Peridium brown, peridial cells 3–5 µm thick, laterally elongated, apically polyedric. Asci narrowly clavate, with 8 spores, apically arranged in 1–2 rows, 62–65 × 10.5–12 µm. Interascal filaments abundant, strongly ramified and with some anastomoses, c. 1 µm in diam. Ascospores ellipsoid to oblong, with rounded ends, lower cell somewhat narrower, olive-brown at first, later brown, 10–15×5–6 µm. No reaction with IKI (Lugol's solution).

Notes: 1. No authentic material is listed to be present in the remnants of the Vouaux herbarium (Rondon 1969), nor for the herbarium NSW where several further Vouaux collections have been detected (Hawksworth & James 1983). As it cannot be excluded that a duplicate was deposited in the Crozals herbarium (PC, TLON, NY), it would be premature to denominate a neotype.

2. Further specimens are mentioned together with the protologue, one on the thallus of *Diploschistes actinostomus* from Hawaii (leg. A. Faurie), another one on thallus of *Rinodina exigua* collected near Dunkerque (leg. B. de Lesdain). These paratypes are unlikely to be conspecific.

3. According to the characters mentioned in the protologue (shape of asci, arrangement of ascospores) and confirmed by own observations on the

specimens cited below, it is evident that the species does not belong to *Didymocyrtis* but to *Polycoccum* s.str.

4. Physciaceae are specially rich in *Polycoccum* species. So far 6 species are distinguished and more to be described. Among those growing on hosts with crustose thalli, beside *Polycoccum stellulatae*, further taxa have been recognized on *Buellia* coll. (*Didymosphaeria echinospora* Faurel & Schotter, *Polycoccum epizoharyi* Calat. & V.Atienza), on *Diplotomma* (*Didymosphaeria microstictica* var. *alboatrae* Vouaux), on *Rinodina* (so far unnamed taxon), and on *Dimelaena* (*Polycoccum evae* Calat. & V.J.Rico). From those known to occur also on *Buellia*, *Didymosphaeria echinospora* can be distinguished by its strongly verrucose ascospores and *Polycoccum epizoharyi* by its ability to induce the formation of galls and its 4-spored asci.

5. As *Buellia stellulata* is a very widely distributed species, also its lichenicolous fungus *Polycoccum stellulatae* can be expected to be present on all continents except Antarctica.

Known distribution and previous records: The species has so far only been recorded from France.

Exsiccata examined: -.

Specimens seen:

SOUTH AMERICA: **Uruguay**: Dpto. Florida, Ruta 41 y Arroyo Sauce de Mansavillagra sobre rocas graníticas en una pradera, on *Buellia stellulata* (th.), 25. II. 1974, leg. H. S. Osorio 7036c (GZU). – **Juan Fernandez Islands** [archipelago belonging to Chile]: Santa Clara, El Morro del Spartán (= Morro de los Alelíes), summit plateau, ca. 10 m, on *Buellia stellulata* (th.), 15. XII. 1965, leg. H. A. Imshaug 38232a (GZU).

Endococcus bryonthae var. … Arnold, Verh. K.-K. Zool.-Bot. Ges. Wien 24: 282 (1874).

Key characters for identification: “apoth. punctiformia, emersa apice non vel vix pertusa, atra; hym. jodo fulvesc., paraph. indistinctae, subnullae, sporae incolores, 1 septatae, hic inde cum 3—4 guttulis rotundis vel subquadratis, elongato oblongae, 0,022—24 Mm. lg., 0,005 Mm. lat., 8 in ascis elongatis” (Arnold 1874b: 282).

Notes: 1. Arnold regarded this fungus as similar to *Didymocyrtis bryonthae* but different on variety level, however he did not formally describe that taxon. He evidently collected it at two localities (both in Austria, one in Nordtirol, the other one in Osttirol) (Arnold 1874b: 282, 1878: 257), both different from the type locality of *Endococcus bryonthae.* The majority of consecutive records of *Polycoccum bryonthae* s.str. refer to these primary data based on a misunderstanding of Arnold’s original text.

2. From the characters given in the description by Arnold (see above) and seen in the revised material, namely colour and size of the ascospores, the fungus belongs to a different ascomycete species of so far unclear relationship.

3. *Pertusaria bryontha* is sometimes (e.g., Aptroot 1995a: 59) erroneously given as host in Arnold, Lich. exs. 615 distributed under the name *Endococcus bryonthae*. See above under *Didymocyrtis bryonthae*!

Exsiccata examined: -.

Further specimens seen:

EUROPE: **Austria**: [Tirol], Brenner in Tirol, Gneisboden ober dem Wilden See bei 7000' [Wiener Fuß], auf *Pertusaria bryontha* (ap.), VIII. 1872, leg. F. Arnold (M). – [Tirol], Osttirol, Windischmatrei in Tirol, am Aufstieg zum Rottenkogel, auf *Pertusaria bryontha* (ap.), VIII. 1876, leg. F. Arnold (M).

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